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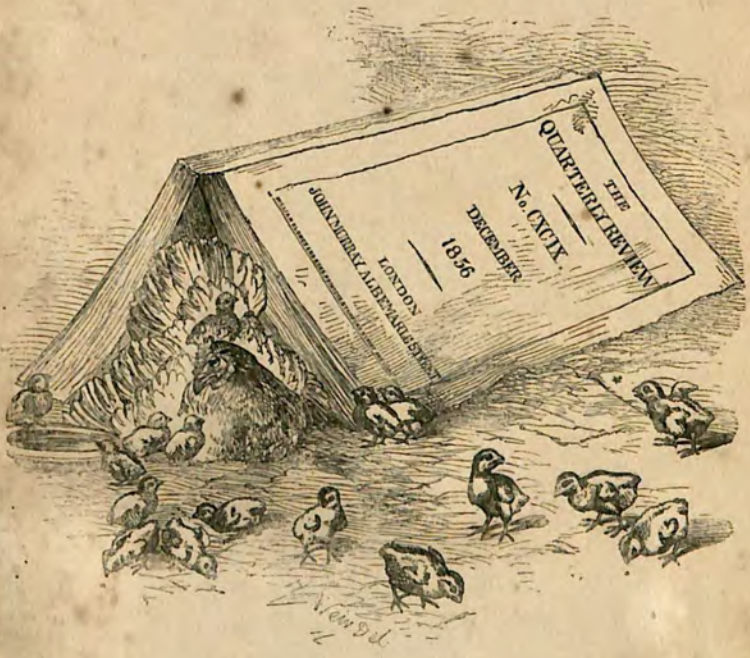
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DESCRIPTIVE ESSAYS.

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CONTRIBUTED TO THE QUARTERLY REVIEW.

By SIR FRANCIS B. HEAD, BART.



IN TWO VOLUMES.—VOL. II.

44788
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LONDON:
JOHN MURRAY, ALBEMARLE STREET.
1857.

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PRINTED BY
JOHN EDWARD TAYLOR, LITTLE QUEEN STREET,
LINCOLN'S INN FIELDS.



DESCRIPTIVE ESSAYS.

THE AIR WE LIVE IN.

In the winter of 1837, fever was unusually severe in Spitalfields, and alarm being thereby excited of a return of the cholera, the Poor-Law Commissioners deemed it their duty to send thither Dr. Arnott, Dr. S. Smith, and Dr. Kay, to inquire as to the *removable causes of disease;* and these experienced physicians, in their Report, dated May 12, 1838, having declared the chief causes to be bad drainage and bad ventilation, the Commissioners, without loss of time, represented to Lord John Russell "the urgent necessity of applying to the Legislature for immediate measures for the removal of those constantly acting causes of destitution and death. "*All delays,*" they said, "*must be attended with extensive misery; in a large proportion of cases the labouring classes, though aware of the surrounding causes of evil, have few or no means of avoiding them, and little or no choice of their dwellings.*" But although much was said and done for the Hill Coolies and the Blacks, no notice whatever was

taken of this appeal; until, towards the end of the Session of 1839, the Bishop of London, in the House of Lords, not only called the attention of the Government to the Report, but moved an address to Her Majesty, praying for an inquiry as to the extent to which the causes of the disease—stated by the Poor-Law Commissioners to prevail among the labouring classes of the metropolis—prevail also among the labouring classes in *other* parts of the kingdom. This address being carried, Lord John Russell directed the Poor-Law Board to institute such an inquiry, and the Commissioners, in the month of November following, gave instructions accordingly to their assistants. They likewise addressed letters to the several Boards of Guardians, as well as to their medical officers, requesting them severally to furnish answers to a series of questions enclosed: besides which, a circular letter to the dispensary-surgeons and medical practitioners having been forwarded to the provosts of Scotch Burghs, a resolution was passed by the College of Surgeons of Edinburgh, recommending that all members and licentiates of that body should give every aid to this inquiry. In due time, from a number of medical men, residing in different towns and districts of Scotland, as well as of England, very valuable reports were obtained.

As soon as this mass of MS. was collected in Somerset House, its bulk being evidently more than the Commissioners or Parliament could find leisure to examine, the Secretary of the Board was directed to digest it; and, after comparing its various statements with such

authentic facts as he might obtain from other sources, to frame a Report exhibiting the principal results of the whole investigation. From his own various and extensive personal inspections, from the information which had been forwarded to the Commissioners, from the documents of the medical officers, and from his examination of witnesses, Mr. Chadwick, after nearly two years' labour, succeeded in completing the remarkable Report now before us.

Before, however, we enter upon the first important chapter, we cannot refrain from observing how little the subject to which it particularly relates—namely, the purification by science of the air we breathe—has hitherto been deemed worthy of consideration.

Through our main thoroughfares, such as Oxford-street, Holborn, Piccadilly, the Strand, Pall-Mall, and St. James's-street, the atmosphere would flow with healthful celerity, were it not that to most of these ethereal rivers there are linked on either side, in the forms of courts, alleys, stable-yards, and *culs-de-sac*, a set of vile, stagnant ponds in which the heaven-born element remains "in durance vile," until, saturated with the impurities and sickness of its gaol, it flows into, mixes with, and pollutes the main streams we have described. And yet if the *pavement* of St. James's-street be but cleanly swept, those who saunter up and down it, as well as those who in red coats or brown ones sit at club windows, indolently gazing at carriages (many of which, as they roll by, seem mechanically to make their heads nod) appear not to be aware that they are one and all inhal-

ing stale, pent-up, corrupt air, which an ounce of science could have dispersed by circulation. Even the hollow square of the Royal palace is made to retain its block of the stagnant fluid, while several others of our public buildings, like the offices in Downing-street, and like the numerous high "dead" walls enclosing property of the Crown, etc., seem to have been purposely planned to act as tourniquets upon those veins and arteries which, if unobstructed, would give health and ruddiness to the population. Instead, however, of philosophizing any longer in the streets, we will invite our readers to enter with us for a moment into one of the splendid mansions of our Metropolis; and accordingly, ascending its spacious staircase, let us take up our position in the doorway of the second of the suite of drawing-rooms, beyond which, the assemblage, being under high pressure, makes it evidently impossible for us to advance.

We here see before us, a dense phalanx, of both sexes, amongst whom are conspicuous persons of the highest rank, beauty, and wealth in Europe. Upon their education no expense has been spared;—money has done all in its power to add to Nature's choicest gifts the polish of Art. Their dresses are importations from every country of the civilized world. The refreshments are delicacies which it has required months, and in some cases even years, of unremitting attention to obtain. The splendid furniture has every comfort that ingenuity can devise. And yet within this painted sepulchre, what, we ask, is the analysis of the air we are breathing? That lofty duchess's head is sparkling with dia-

monds;—that slight, lovely being leaning on her arm has the pearls of India wound around her brow;—those statesmen and warriors are decorated with stars;—the dense mass displays flowers, ribbons, and ornaments of every colour in the rainbow; but among them all, is there, we ask, a single one who for a moment has thought of bringing with him upon his back, the hogshead of air per hour necessary for his respiration? And if every guest present has neglected to do so, in what manner, it must be inquired, has the noble host provided for the demand? Alas! the massive, pictured walls around us, and richy-stuccoed and gilt ceiling over our heads, answer the question; indeed one has only to cast a glance at them to perceive that the five hundred persons present, like those in the Black-hole at Calcutta, are conglomerated together in a hermetically-sealed box full of vitiated air.

Every minute a thousand gallons of air pass into the lungs of those present, from whence, divested of its oxygen, it is exhaled in a morbid condition unfit for combustion or animal life; every respiration of each elegant guest, nay, even our own contemplative sigh, vitiates about sixteen cubic inches of the element; and yet, while every moment it is becoming more and more destructive to health; while the loveliest cheeks are gradually fading before us; while the constitutions of the young are evidently receiving an injury which not the wealth of Crœsus will be able to repay; what arrangements, we repeat, has the noble host made for preventing or repairing the damage he is creating? If foul air,

like manure, could be carted away, and if good air, like fresh, clean straw, could be brought in its stead, surely one of the simplest luxuries which wealth could offer to society would be to effect this sanitary operation; and thus, instead of offering a set of lovely women ices and unwholesome refreshments, to spend the money these would cost in pouring upon their heads, necks, and shoulders a continual supply of that pure, fresh, exhilarating, oxygenous mixture, which would give animation to their hearts, and colour to their cheeks. But is this expensive, troublesome, complicated, horse-and-cart mode of purifying the horrid atmosphere we are breathing necessary? No; everybody present knows that *outside* the shutters and plate-glass windows of the rooms in which we are suffering, there is at this moment in waiting, not two inches from us, an overwhelming supply of pure air, just as desirous to rush in as the foul air we have been breathing and re-breathing is eager to rush out.

The laws of specific gravity, ordained by Nature to ensure for us the performance of this double process, are in attendance; indeed so great is the supply of spare air in her laboratory, that the proportion of oxygen consumed by animated beings in a century is said not to exceed $\frac{1}{1200}$ of the whole atmosphere; and yet, as though the demon of suicide had prevailed upon us to thwart these beneficent arrangements, we close our doors, bar our windows, stuff up by curtains and drapery every crevice, as if it were the privilege of wealth to feed its guests on foul air!

If any one of our readers, who, like ourselves, has

grown out of patience at the long continuance of this barbarous custom, will take the trouble to put five hundred beautiful little gold and silver fishes into a bladder of the filthiest water he can obtain, and then, attaching a weight, throw the whole into a clear, crystal stream, he may justly say,—ay, and he may grin as he says it,—"*Behold an epitome of a London drawing-room!*" And yet there exists one difference; for, while the human congregation is wilfully breathing an unwholesome mixture, the tiny creatures within the globule are as innocent of the foul suffering *they* endure as are those poor, lean, Neapolitan curs which, almost every day throughout the year, may be seen half choked by the rope that is dragging them towards the Grotto del Cane, in order that one more good-humoured, ruddy-faced, inquisitive English family may see them forcibly suffocated in unwholesome gas.

From the foregoing facts, should it become apparent that even among people of the highest rank, intelligence, and wealth, there has hitherto existed a lamentable neglect on a subject of such importance to them as the sanitary purification of the atmosphere in which they are living, it is reasonable *à fortiori* to infer that if any one among us would make it his painful duty to penetrate into the courts, alleys, workshops, and residences of the lowest, of the most ignorant, and of the most destitute classes of our society, he would most surely detect a still greater disregard of scientific precautions, directly and flagrantly productive of misery and disease.

Now if there was nothing at stake but the health, hap-

piness, moral conduct, and condition of the labouring classes, the searching investigation unveiled in Mr. Chadwick's Report, coupled with the remedial measures submitted by him for consideration, ought to win as well as claim our most serious attention; but when we reflect that the air the labouring classes breathe; the atmosphere which by nuisances they contaminate, is the fluid in which rich and poor are equally immersed; that it is a commonwealth in which all are born, live, and die equal; it is undeniable that a sanitary inquiry into the condition, for instance, of the ten thousand alleys, lanes, courts, etc., which London is said to contain, becomes a subject in which every member of the community is self-interested. Where nearly two millions of people are existing together in one town, it is frightful to consider what must be the result in disease, if every member should, even to a small amount, be neglectful of cleanly habits. It is frightful also to contemplate what injury we may receive, not only from the living, but from the fifty thousand corpses which are annually interred in our Metropolis; indeed no man who will visit our London churchyards can gaze for a moment at the black, cohesive soil, saturated with putrid animal matter, which is daily to be seen turned up for the faithless reception of new tenants, without feeling that the purification of our great cities, and a watchful search throughout the land we live in for every removable cause of disease, are services which science should be proud to perform, which a parental Government should strenuously encourage, and which Parliament should deem its bounden duty to enforce.

If foul air and pure air were of different colours, we should very soon learn to repel the one and invite the other; in which case, every house would be ventilated, and air-pipes, like gas-pipes and water-pipes, would flow around us in all directions. Although however we do not often see miasma, yet, in travelling over the surface of the globe, how evident are its baneful effects, and how singularly identical are they with those patches of disease which are to be met with, more or less, in every district of this country! Let any one, after traversing the great oceans, contrast their healthful atmosphere with the low, swampy parts of India, with the putrid woods of the Shangallah in Abyssinia, or with any part of the western coast of Africa. In all these regions miasma is either constantly or periodically generated by the corruption of vegetable matter; and the following description of the effects of this virus on the white population of Sierra Leone is more or less equally applicable to all:

"Those who are not absolutely ill are always ailing; in fact, all the White people seem to belong to a population of invalids. The sallowness of their complexion, the listlessness of their looks, the attenuation of their limbs, the instability of gait, and the feebleness of the whole frame, that are so observable in this climate, are but too evident signs, even where organic disease has not yet set in, that the disordered state of the functions, which goes under the name of impaired health, exists, and in none is it more painfully evident than in the general appearance of the European women and children of this colony."*

* *Vide* Appendix to Report from the Select Committee on West Coast of Africa, ordered by the House of Commons to be printed, 5th August, 1842, p. 244.

In corroboration of this statement, we may mention as a single example that, out of 150 men of the 2nd West India Regiment, who in 1824 were sent to Cape Coast Castle, all, excepting one, were either dead or sent home invalided in three months. At the expiration of this time, Sir John Phillimore, arriving off the coast in command of the 'Thetis,' sent on shore two midshipmen and fourteen men, to mount a gun on a height. The party slept there only a night, yet, in one fortnight, every individual excepting a black man was dead!

In the opposite continent of America, even in healthy regions, wherever the land has been flooded for the purpose of canal navigation, the trees all die, and, as the passenger-barge winds its way by moonlight through these pale, barkless corpses, we have seen a green coating of vegetable matter, about as thick as a blanket, and very appropriately called by the inhabitants "*fever and ague*," writhing in folds before the prow.

Even in the most salubrious of the new settlements, where the air had hitherto been always pure, dry, exhilarating, and the sky as blue as in Italy, the moment the virgin earth is by the emigrant turned up for the first time, the decomposition of vegetable matter brought to the surface invariably produces sickness; and thus a whole family of little English children, with their teeth chattering from ague, have too often been found mourning in the wilderness, on an oasis, "the garden and the grave" of their father who made it.

In like manner, in this country, it has been shown by abundant evidence that on whatever patches of land, es-

pecially in towns, vegetable or animal matter is allowed to putrefy, *there* disease, more or less virulent, is engendered; indeed it has been repeatedly observed that the inhabitants of a particular house have continued for years to be constantly afflicted with the very languor and fever described by every African traveller, which at last has been ascertained to have been caused by the introduction, into the immediate neighbourhood, of a couple of square feet of Sierra Leone; or, in plainer terms, by a grated untrapped gully-drain, from which there has been constantly arising a putrid gas: and yet, instead of a few square feet, how many acres of Sierra Leone are, to our shame, existing at this moment in our Metropolis, in the shape of churchyards! For instance, there is one burial-ground, now in use in London, which contains, under an acre of surface, 60,000 corpses! In another spot, a crowd of young children are, at this moment, learning their lessons for six hours per day over a floor under which 12,000 dead bodies are festering!*

Mr. Chadwick produces a tabular account of the mortality of England and Wales within the year 1838, caused by diseases, which, he says, medical officers consider to be most powerfully influenced by the physical circumstances under which the population is placed; namely, the external and internal condition of their dwellings, drainage, and ventilation. In this category, the number of deaths amounted to 56,461: which Mr. Chadwick, truly enough, observes to be as if Westmore-

* See evidence taken before the Committee of the House of Commons on the Improvement of Towns, etc., printed in 1842.

land, or Huntingdonshire, were every year to be entirely depopulated. He adds:—

"that the annual slaughter in England and Wales, from preventable causes of typhus, which attacks persons in the vigour of life, appears to be double the amount of what was suffered by the Allied armies in the battle of Waterloo; . . . that diseases which now prevail on land did, within the experience of persons still living, formerly prevail to a certain extent at sea, and have since been prevented by sanitary regulations; and that when they did so prevail in ships of war, the deaths from them were more than double in amount of the deaths in battle."

But the precise number of our labouring population that actually *die* per annum, from diseases which are preventable, bears but a small proportion to the number of those who—although they have, as it is commonly termed, "escaped from the attack"—have been subjected for a melancholy period to loss of labour from debility.

Mr. Chadwick, having endeavoured to define in general terms the aggregate extent and operation of the evils complained of, thus proceeds to consider them separately in detail.

I. *General condition of the residences of the labouring classes where disease is found to be the most prevalent.*

In this investigation, highly interesting to all classes of the community, are detailed the varied forms in which disease, *attendant on removable circumstances*, has been found to pervade the population of rural villages and small towns, as well as of those commercial cities,

and densely-crowded manufacturing suburbs, in which pestilence has been supposed to have its chief and almost exclusive residence.

For instance—to begin with one of the prettiest towns in one of the most charming parts of England—Mr. Gilbert reports that, his attention having been excited by the high diet recommended to the Guardians at *Tiverton*, in consequence of prevalent fever, he requested the medical officer of the Union to accompany him through a certain portion of that district. Before however even reaching it, he was assailed by a smell clearly proclaiming the presence of malaria: he found the ground marshy, the sewers all open, some of the houses surrounded by wide uncovered drains full of animal and vegetable refuse. The inhabitants of these localities were distinguishable from those of the clean parts of the town by their sickly, miserable appearance: all he talked to either were or had been ill, and they presented a melancholy picture. The local authorities had often endeavoured to compel them to remove nuisances, and to cover the drains, but as, under the present state of the law, their powers were not sufficient, the evil had continued: accordingly, medical officers had been employed instead of the engineer; and, "comforts" and "high diet," instead of masonry and drainage.

It is quite true, that, as there are specks in the sun, so in a large country like England there must unavoidably exist a few dirty places, which Mr. Chadwick or any searching inquisitor has the power, at

his pleasure, to point out. We own, however, we were not a little startled at learning that Royalty itself was not only lately prevented from visiting Holyrood or Brighton, on account of fever proceeding from miasma, but that there exist loathsome nuisances dangerous to the public health, in its immediate neighbourhood, even at Windsor!

Mr. Parker, after stating that there is no town in the counties of Buckingham, Oxford, and Berks, in which the condition of the courts and back streets might not be materially improved by drainage, observes:—

"Windsor, from the contiguity of the Palace, the wealth of the inhabitants, and the situation, might have been expected to be superior in this respect to any other provincial town. Of all the towns visited by me, *Windsor is the worst beyond all comparison.* From the Gas-works at the end of George-street a double line of open, deep, black, and stagnant ditches extends to Clewer-lane. From these ditches an intolerable stench is perpetually rising, and produces fever of a severe character. Mr. Bailey, the relieving officer, considers the neighbourhood of Garden-court in almost the same condition. 'There is a drain,' he says, 'running from the Barracks into the Thames across the Long Walk. That drain is almost as offensive as the black ditches extending to Clewer-lane. The openings to the sewers in Windsor are exceedingly offensive in hot weather. The town is not well supplied with water, and the drainage is very defective.'"

As snipes and wild-fowl, when they visit this country, at once fly to our marshes and fens, so does the cholera, wherever it travels, instinctively select for itself lodgings most congenial to its nature. The following

glimpse of one of them, in which the disease first made its appearance, deserves therefore attention. Mr. Atkinson, describing Gateshead, says of a person whom he found ill of the cholera:—

"His lodgings were in a room of a miserable house situated in the very filthiest part of Pipewell-gate, divided into six apartments, and occupied by different families, to the number of twenty-six persons in all. The room contained three wretched beds, with two persons sleeping in each: it measured about twelve feet in length, and seven in breadth; and its greatest height would not admit of a person's standing erect: it received light from a small window, the sash of which was fixed. Two of the number lay ill of the cholera, and the rest appeared afraid of the admission of pure air, having carefully closed up the broken panes with plugs of old linen."

Mr. Chadwick, however, states that the most wretched of the stationary population of which he had been able to obtain any account, or that he had ever beheld, was that in the wynds of Edinburgh and Glasgow. "It might admit of dispute," he observes, "but on the whole, it appeared to us that both the structural arrangements, and the condition of the population in Glasgow, were the worst of any we had seen in any part of Great Britain." Dr. Arnott, who perambulated the wynds of Glasgow, accompanied by Dr. Alison and Dr. Cowen, corroborates the above statement by details too offensive to be transcribed: suffice it to say, that, from one locality, seven hundred and fifty-four, of about five thousand cases of fever which occurred in the previous year, were carried to the hospitals. As a

striking contrast to this result, Mr. Chadwick states that, when the kelp manufacture lately ceased on the western coast of Scotland, although a vast population of the lowest class of people were thrown into extreme want—suffering from cold, hunger, and despair—nevertheless, from their scattered habitations being surrounded by pure air, cases of fever did not arise among them.

We will conclude this branch of the investigation by a very brief description of Inverness, copied from no less an authority than the Report of its own chief magistrate.—"Inverness," says the worthy Provost, "is a *nice* town, situated in a most beautiful country. . . . The people are, generally speaking, a *nice* people, but their sufferance of *nastiness* is past endurance."

II. *Public arrangements external to the residences, by which the sanitary condition of the labouring population is affected.*

This chapter Mr. Chadwick principally devotes to practical details as to drainage. We must content ourselves with a few specimens of his alleged facts.

Dr. Duncan doubts whether there is a single court in Liverpool which communicates with the street by an underground drain: and, having observed that sixty-three cases of fever had occurred in one year in Union-court, containing twelve houses, he visited it, and found the whole court inundated with fluid filth which had oozed through the walls from two adjacent cesspools. In one cellar he discovered, below the bed where the *family* slept, a well four feet deep, into which this

stinking fluid had been allowed to drain. It may be observed that there are eight thousand of these inhabited cellars in Liverpool, containing from thirty-five thousand to forty thousand inmates; and that of two thousand three hundred and ninety-eight courts, which were examined, one thousand seven hundred and five were closed at one end so as to prevent ventilation.

"Until very lately," says Mr. Burton, in his Report on "Edina, Scotia's darling seat,"

"the Cowgate, a long street, running along the lowest level of a narrow valley, had only surface drains. The various alleys from the High-street, and other elevated ground, open into this street. In rainy weather they carried with them each its respective stream of filth, and thus the Cowgate bore the aspect of a gigantic sewer receiving its tributary drains."

Again, in a medical report on Stirling, it is stated that the drains or sewers,—*Scotticè*, "sivers,"—are all open; that the sweepings of the public streets remain on the pavement many days; that the refuse from the Gaol, which contains, on an average, sixty-five persons, is floated down the "sivers" every second or third day, emitting, during the whole of its progress, the most offensive odour; that from the slaughter-house, situated near the top of the town, the blood is allowed to flow down the main street; and that the sewers from the Castle, discharged into an open field, pollute the atmosphere to a dreadful degree.

As a contrast to this wholesale account, the examination of Mr. T. Thomson, of Clitheroe, affords a striking proof, how small, even in solitary dwellings, may

exist the removable cause of disease. In the summer of 1839, some bad cases of fever occurring among a cluster of houses at Littlemoor, which had always been considered healthy, attention was drawn to the spot. An old, half-choked drain was discovered, which was the cause of a shallow, stagnant, fœtid pool. Measures were immediately taken to carry off this nuisance by a sewerage, and "from the hour of the removal of the filth," says Mr. Thomson, "no fresh case of fever occurred."

Again, Portsmouth, which is built on a low portion of the marshy island of Portsea, was formerly extremely subject to intermittent fever: the town was paved in 1769, and, according to Sir Gilbert Blane, from that date this disorder no longer prevailed; whilst Kilsea, and the other parts of the island, retained their aguish disposition till 1793, when a drainage was made, which subdued its force there also.

In the chapter before us we have also many very instructive details as to the pecuniary results of removing the refuse of towns.

It appears from the evidence of Mr. Dark, of Paddington, who for many years has been a considerable contractor for scavengering, etc., that with the exception of coal-ashes (used for brick-making), lees, and a few other inconsiderable items, no refuse in London pays half the expense of removal by cartage beyond a radius of about six miles. "*I have given away,*" says Mr. Dark, "*thousands of loads of night-soil—we know not what to do with it!*"

When however Mr. Chadwick visited Edinburgh with Dr. Arnott, they were both, without metaphor, "led by the nose" to a certain stream properly enough called "the Foul Burn," from having been the aged receptacle of most of the sinks, drains, sivers, etc., of Auld Reekie. For a considerable time the character of this burn was repellent:—and accordingly, avoided by poor as well as by rich, by young as well as by old, its contents flowed in mysterious solitude into the sea. Several years ago, however, some of the occupiers of the land in the immediate vicinity, instigated by self-interest, took the liberty of tapping this stream, in order to collect a portion of its contents into tanks for manure. The next step in the march of intellect was, by means of water, to irrigate the meadows from this source, in order to save the expense of cartage; and thus, by degrees, three hundred acres of meadow land, chiefly in the neighbourhood of the Palace of Holyrood, were fertilized from the contents of this common sewer: the result of which has been that some of these meadows are at present let at from £20 to £30 per acre; indeed, some have been let at £38 and even at £57 per acre. Her Majesty's Government, however, having been advised that this process is prejudicial to the healthiness of Holyrood House, and having accordingly directed legal process for the trial of the right of irrigation, the defendants now plead that the invalidation of their claim would deprive the Metropolis of Scotland of the milk and butter of three thousand cows, and estimate the compensation which would be due to themselves at £150,000.

About a quarter of a century ago we ourselves remember to have witnessed a matrimonial alliance, such as we have described, between two parties who from the beginning of time had always been shy enough of each other, namely, the very Foul Burn alluded to, and the Links or sand-hills on the sea-shore between Leith and Portobello. These hillocks, upon which nothing but a few stunted tufts of coarse grass had ever been seen to grow, and which for ages had been blown by the wind into a variety of fantastic forms, were one morning suddenly attacked by a band of workmen, who with spades and shovels were seen busily scattering the sand about them in all directions, although "*Are ye daft?*" was the repeated exclamation of the Musselburgh fishwives, who, striding by with outstretched heads, swinging arms, and a creel full of cod on their inclined backs, thus expressed their astonishment at seeing the dry region, which all their lives had been sterile, suddenly subjected to spade-husbandry. Indeed, when the mass was levelled it was as barren and lifeless as the sand of the sea; and it continued so during the formation of a network of arteries and veins which, in the form of drains, were imprinted over its surface. However, no sooner was this latter operation concluded, than—"*Oh whistle, and I'll come to ye, my lad!*"—the produce of the Foul Burn, like Birnham Wood coming to Dunsinane, made its appearance: literally in a few days the sand was verdant; and before the summer was over we beheld it bear a dark-coloured, rank, luxuriant crop.

Our readers will probably have anticipated that the

inference which Mr. Chadwick has drawn from these results, and from Mr. Dark's statement that he can find no sale for the refuse of London, is that the sewers of London, like those of Edinburgh, might be made to fertilize the land in their vicinity.

Mr. Chadwick states that, according to the scale of the value of that portion of the refuse of Edinburgh which has been appropriated to irrigation in the way described, the whole refuse of that city would produce an income of from £15,000 to £20,000 a year; and yet that, in the City of London, refuse to the enormous value of nearly double what is now paid for the water of the Metropolis is thrown away, principally into the Thames, and partly into receptacles in the districts of the poor, where it accumulates until it is removed at a great expense. Where the levels are not convenient, Captain Vetch, of the Engineers, and other competent authorities recommend that the contents of the London sewers should be lifted by steam-power, as water is raised in the drainage of the fens, and then be distributed in iron pipes, in the same way as water is *in*jected into the Metropolis by the Water-Companies. Mr. Chadwick adds, that the estimated expense of this mode of cleansing and removal, would not amount to a tenth part of the cost of cartage:—and to show the practicability of the principle of removing refuse by water, he cites the following case:—The West Middlesex Water Company had almost concluded a contract for removing, in the ordinary way, about an acre of silt four feet deep, which in the course of eight or ten years had accumulated in their reservoir

at Kensington; and accordingly £400 was to be paid for this operation, which was to occupy three or four weeks. The bargain was all but sealed, when it was proposed by one of the officers that the silt should be mixed with water, stirred up, and in this liquid state washed away; an operation which was successfully effected in three or four days, at an expense of only £40 or £50.

In small, moderate-sized, or even in large towns, *where the levels are favourable,* we are much inclined to believe that Mr. Chadwick's project of removing refuse by means of water might be successfully adopted for the purpose of irrigation. It is evident, however, that many previous arrangements would be necessary, and that, after all, many serious difficulties would be likely to occur:—for it must always be recollected that, in the case at Edinburgh, the old "Foul-Burn" remains a safety-valve communicating with the sea: whereas a covered sewer must blindly administer all it possesses—without consideration or mercy—its motto being "Time and tide can wait for no man." Moreover, the supply of the manure and the demand for it might not agree together for any length of time. Still, however, by proper arrangements these evils might be compensated, in which case there can be no doubt that an immense saving of cartage would be effected:—that the health of the town would be materially benefited;—and that the produce of the land irrigated would abundantly increase.

But, although we are willing thus far to give Mr. Chadwick credit for his suggestion, and think it ought to be

most seriously attended to in the case of our smaller towns, especially such as have considerable streams running through or near them, we must say we consider his attempt to extend the theory to London, by the application of the lifting power of steam, preposterous in principle as well as in detail.

The first idea that naturally occurs is the enormous expense and incalculable inconvenience that would be attendant upon the condemnation of nearly the whole of the existing sewers of London, which at present run downwards into the Thames. But admitting this first objection to be overruled: supposing for a moment that the old sewerage was destroyed, and the new subterranean works on completely different levels were constructed, there remain to be encountered difficulties aboveground which we consider to be insurmountable.

It appears, from a Parliamentary Return lying before us, that the water pumped into London by the New River, Chelsea, West Middlesex, Grand Junction, East London, South London, Lambeth, and Southwark Water Companies amounts to 4222 cubic feet per minute, day and night, throughout the year; of which quantity, considerably more than one-half flows through waste-pipes, etc., into the sewers: and if, moreover, according to Mr. Chadwick's project, the refuse of the streets of London, instead of being swept up and carted away, as hitherto, were daily to be washed into the gully-drains by a water-hose, the amount of fluid which the Companies would be required to supply must be very considerably enlarged. To this flood of water, if there be added the

usual contents of the sewers, it at once appears how enormous would be the amount of the mixture to be daily ejected from the metropolis: and if, from any accident to the engines, the lifting-power, pumps, or bucketed-wheels should suddenly be disabled, it is evident that a constipation of the sewerage must forthwith take place.

But there remains to be provided for a contingency infinitely more alarming. The area of London is, we believe, nearly sixty square miles: but, taking it only at forty square miles, and estimating that during a thunder-storm and continued rain there might fall in the space of six hours* one inch of water, that quantity, on the surface last mentioned, would amount to 92,928,000 cubic feet of water, of which the greater portion would immediately go into the sewers. Now, when it is considered that the natural flow of the Coln river amounts only to about 6000 cubic feet per minute, that of the Exe to about 5000, and that of the Lea to about 5600, our readers will at once perceive what an overwhelming amount of fluid would, within a very short space of time, be added to the already enormous contents of the London sewers, to be lifted by steam-power; and while the elements of heaven were raging over the venerable head of our metropolis;—while the thunder was rolling;—while the forked lightning was shivering one or two of our finest church-spires;—and while the rain was reverberating from the pavement like myriads of tiny fountains

* It appears, from the rain-gauge at Somerset House, that on Tuesday, the 30th of August last, nearly two inches of rain fell in two hours.

rising out of the ground;—if at this awful moment the tell-tale wind were suddenly to inform our olfactory organs that, Mr. Chadwick's "infernal machines" having more work than they could perform, their neighbourhoods had become inundated; if the next blast were to announce to us that the main sewers were blowing up;—and then, by evidence every moment becoming more and more insufferable;—if, out of every gully-grate in the Metropolis there was suddenly to spout up that which, like "a legion of foul fiends," no man could control;—we fear that this *Somerset* House "*Amendment Act*" would be a theme of general execration, and that the Poor-Law Commissioners, like their sewers, would be in bad odour. . . .

But admitting for a moment that Mr. Chadwick may be enabled to demonstrate that the contents of the London sewers, with the extraordinary additions to them during rains and thunder-storms, could not equal the quantity of water which in many parts of England is at present raised in draining our fens; in short, that, the power of steam being invincible, a sufficient number of pumps, or rather of bucketed wheels (say 500 engines of 100-horse power each*) might be prepared to meet any contingency that could occur; yet we maintain that the amount of fluid manure so lifted would be infinitely more than could possibly—we need not say *pleasantly*—be applied by irrigation;—that the superabundance must go somewhere;—and that, after all, the greater portion of the

* In the Cornish engines it is supposed that each horse-power can raise 528 cubic feet of water per minute to a height of one foot.

quantity lifted would inevitably find its way to the Thames, from which, by so much labour and expense, we had attempted to divert it.

The next topic considered by the Commissioners is the severe privations which the labouring classes are subjected to from want of water, not only for ablution, house-cleaning, and sewerage, but for drinking and culinary purposes. For instance, Mr. Mott states, in his Report on Manchester, that there, as elsewhere, it is the custom of owners of small cottage property in neighbourhoods where there are no pipes laid, to erect for a given number of houses a pump, which is frequently rented by one of the tenants, who taxes the rest for using it. One poor woman told him that she was required to pay a shilling a month for permission to use this pump, while the water-companies were giving an abundant supply to houses like hers for six shillings a year—exactly half the money. In various Scotch towns the people have to go to public wells, the supply of which is so tardy, that crowds of women and children are obliged, as it is called, to "wait their turns;"—indeed, these wells are sometimes frequented *throughout the whole night*. In Edinburgh many have to travel to wells at a considerable distance, and afterwards to carry their *stoups* up five, six, or seven stories. In several places the poor are often obliged to collect water from ditches and ponds, so impure, that even horses that have not been accustomed to drink it are apt to suffer from it. At Tranent some of the labourers use barrels drawn on carriages;—others employ their children to bring it in

small vessels; and during the cholera, Dr. Scott Alison reports, it became so scarce, that the poor people went into the ploughed fields to collect the rain-water retained in depressions in the ground, and even in the prints made by horses' feet.

On the foregoing facts Mr. Chadwick justly observes:—

"Supplies of water obtained by the labour of fetching and carrying it in buckets do not answer the purpose of regular supplies brought into the house without such labour, and kept ready in cisterns. The interposition of the labour of going out and bringing home water from a distance, acts as an obstacle to the formation of better habits; and in the actual condition of the lower classes, conveniences of this description must precede and form the habits. Even with persons of a higher condition the habits are greatly dependent on the conveniences: it is observed that, when the supplies of water into houses of the middle class are cut off by the pipes being frozen, and it is necessary to send to a distance, the house-cleansings and washings are diminished; and every presumption is afforded that if it were at all times, and in all weathers, requisite for them to send to a distance for water, their habits of household cleanliness would be deteriorated. The whole family of the labouring man in the manufacturing towns rise early, before daylight in winter-time, to go to their work; they toil hard, and they return to their homes late at night: it is a serious inconvenience to them to have to fetch water from the pump or the river, on every occasion that it may be wanted, *whether in cold, in rain, or in snow.* The minor comforts of cleanliness are of course foregone, to avoid the immediate and greater discomforts of having to fetch the water."

In our manufacturing towns, those members of a family who are old enough to fetch water are of course

strong enough to work: the mere value therefore of the time they expend at the pump is almost always more than the demand made by the Companies for a regular and constant supply of water. For instance, in Glasgow the charge of supplying a labourer's tenement is five shillings a year; in Manchester, six shillings; in London, ten—for a tenement containing two families; for which sum two tons and a half of water per week may be obtained. Thus, for less than one penny farthing per week one hundred and thirty-five pailfulls of water are taken into the house without the labour of fetching, without spilling, without being in the way, and yet in constant readiness for use: whereas, on the other hand, the cost to a labourer, or to any member of his family whose time can be employed in work, is very serious. Accordingly, in the Bath Union, a poor fellow who had to fetch water from one of the public wells about a quarter of a mile from his house, quaintly observed to the Rev. Whitwell Elwin, *"It's as valuable as strong beer!"*

At Paris, the usual cost of the filtered water which is carried into the houses, is two sous per pailfull, being at the rate of nine shillings per ton: while in London, the highest charge of any of the Companies for sending the same quantity of water to any place within the range of their pipes, and delivering it at an average level of a hundred feet, is six *pence* per ton.

"The mode, however," says Mr. Chadwick, "of supplying water by private companies, *for the sake of a profit*, is not available for a population where the numbers are too small to de-

fray the expense of obtaining a private Act of Parliament, or the expense of management by a Board of Directors, or to produce profits to shareholders."

As regards an adequate supply of water for the labouring classes, we are clearly of opinion that a case for the necessity of legislative interference on the largest scale has been made out.

III.—*Circumstances chiefly in the internal economy and bad ventilation of places of work; workmen's lodging-houses, dwellings, and the domestic habits affecting the health of the labouring classes.*

In explaining the evils which arise from bad ventilation in places of work, Mr. Chadwick adduces first the case of the journeymen tailors, whose habits of life he was led to investigate from the number of early deaths observed to occur among them.

Thomas Brownlow, aged fifty-two, who had worked for Messrs. Stultze, Messrs. Allen, and in others of the largest and most fashionable establishments in London, stated that at Messrs. Allen's, in a room sixteen or eighteen yards long, and seven or eight yards wide, eighty men worked close together, knee to knee; that in summer-time the heat of these tailors and of their geese, or irons, raised the temperature of the air they lived in, twenty or thirty degrees; that after the candles were lighted, it became so insufferable that several of the young men from the country fainted; that during the season he had seen from £10 to £50 worth of work spoiled by the perspiration of the men; that in winter the atmosphere be-

came still more unhealthy, with so depressing an effect that many could not stay out the hours; that too many, losing their appetite, took to drink as a stimulant;—that accordingly at seven in the morning, gin was brought in, sometimes again at eleven, at three, at five, and after seven, when the shop was closed; that great numbers died of consumption. It appears that the average age of these workmen was about thirty-two; that in a hundred there were not ten men of fifty; lastly, that when they died, no provision was made for their families, who, if they could not do for themselves, were obliged to go on the parish. Yet Messrs. Allen's wages at the time the witness refers to were 6*d.* an hour.

In a well-ventilated room, it is stated by several witnesses, that journeymen tailors would be enabled to execute two hours' more work per day; that they would do their twelve hours' work, whereas the utmost in a close, ill-ventilated room, is ten hours. Moreover that a man who had worked in these hot rooms from the age of twenty would not be as good a man at forty as another would be at fifty who had worked in well-aired shops in the country. In other words, the latter, simply from purer air, would have gained ten years' labour, besides saving the money spent in gin.

On the whole, it appears that, taking the average loss to a London tailor to be two hours per day for twenty years, and twelve hours for ten years, his total loss would amount to 50,000 hours of productive labour, which, at 6*d.* per hour, would have produced him £1250; indeed this is £250 less than was actually earned and saved by

Philip Gray, who worked all his life as a journeyman tailor, and was remarkable for his cleanliness and neatness.

Of the registered causes of death of 233 persons entered during the year 1839, in the Eastern and Western unions of the Metropolis, under the head "tailor," no less than 123 were from disease of the respiratory organs; ninety-two from consumption: in the whole number only twenty-nine died old.

"The subscriptions," says Mr. Chadwick, "to the benevolent Institution for the relief of the aged and infirm tailors by individual masters* in the Metropolis appear to be large and liberal, and amount to upwards of £11,000; yet it is to be observed, that if they or the men had been aware of the effects of vitiated atmospheres on the constitution and general strength, and of the means of ventilation, the practicable gain of money from the gain of labour by that sanitary measure could not have been less in one large shop, employing two hundred men, than £100,000. Independently of subscriptions of the whole trade, it would, during their working period of life, have been sufficient, with the enjoyment of greater health and comfort by every workman during the time of work, to have purchased him an annuity of £1 per week for comfortable and respectable self-support during a period of superannuation, commencing soon after *fifty* years of age.

"The effects of bad ventilation, it need not be pointed out, are chiefly manifested in consumption, the disease by which the greatest slaughter is committed. The causes of fever are

* Mr. Stultze, for instance, has subscribed £795 in money; is a yearly subscriber of twenty-five guineas; has made a present to the "Benevolent Institution for the Relief of Infirm Tailors" of ground worth about £1000; and has besides undertaken to build thereon six houses for the reception of twenty poor pensioners.

comparatively few and prominent, but they appear to have a concurrent effect in producing consumption."

The results of good ventilation in the prevention or alleviation of disease are clearly manifested in our hospitals. In a badly ventilated house—the Lying-in Hospital in Dublin—there died in four years 2944 children out of 7650; whereas, after this establishment was properly ventilated, the deaths in the same period, and out of a like number of children, amounted only to 279.

Glasgow supplies a striking example of the beneficial effects of giving pure air to a factory. In a range of buildings, called "the Barracks," five hundred persons were collected; and all attempts to induce them to ventilate their rooms having failed, the consequence was that fever was scarcely ever absent. Sometimes there were seven cases in a day; and in the last two months of 1831 there were fifty-seven. On the recommendation of Mr. Fleming, a surgeon, there was fixed in the ceiling of each room a tube of two inches in diameter, communicating with a large pipe, the end of which was inserted in the chimney of the factory furnace, which, by producing a strong draught, forced the inmates to breathe *fresh air*. The result of this simple contrivance was that, during the ensuing eight years, fever was scarcely known in the place!

It would be a task infinitely more easy than pleasing to show the havoc annually created among the manufacturing masses by defective ventilation and overcrowding. We will however only observe that in the case of milliners and dress-makers in the Metropolitan

Unions during the year 1839, as shown by the mortuary register, out of 52 deceased, 41 only had attained the age of 25; the average age of 33, who had died of disease of the lungs, was 28. In short, it is but too true that among these poor workwomen, as in the case of the journeymen tailors, one-third at least of the healthful duration of adult life is sacrificed to our ignorance or neglect of ventilation. Alas! how little do the upper classes, who fancy that the cheque on their banker completely settles the account, reflect on the *real* cost of the beautiful dresses they wear!

With respect to "*the want of separate apartments, and the overcrowding of the private dwellings of the poor,*" a very small portion only of the evidence adduced will suffice. The clerk of the Ampthill Union states that, in his district, a large proportion of the cottages are so small, that it is impossible to keep up even the common decencies of life. In one of them, containing only two rooms, there existed eleven individuals; the man, his wife, and four children (one a girl above fourteen, another a boy above twelve) slept in one of the rooms and in one bed; the rest slept all together in the room in which their cooking, working, and eating were performed. The medical officer of the Bicester Union has witnessed a father, a mother, three grown-up sons, a daughter, and a child, all lying at the same time with typhus fever in one small room. The medical officer of the Romsey Union states that he has known fourteen individuals of one family (among whom were a young man and young woman of eighteen and twenty

years of age) sleeping together in a small room; the mother being in labour at the time.

The Rev. Dr. Gilly, whose able 'Appeal on behalf of the Border Peasantry' is cited in the Report, describes a fine, tall Northumbrian peasant of about forty-five years of age, whose family, eleven in number, were disposed of as follows. In one bed he, his wife, a daughter of six, and a boy of four years, had to sleep;—a daughter of eighteen, a son of twelve, a son of ten, and a daughter of eight, had a second bed;—and in the third were three sons, aged twenty, sixteen, and fourteen.

The greatest instances of overcrowding appear however, as may naturally be expected, at Glasgow, Manchester, Liverpool, etc. In Hull, a mother about fifty had to sleep with a son above twenty-one, a lodger being in the same room. In Manchester more than half-a-dozen instances were given of a man, his wife, and his wife's grown-up sister habitually occupying one bed. Mr. Baker, in his Report on Leeds, states, "In the houses of the working-classes, brothers and sisters, and lodgers of both sexes, are found occupying the same sleeping-room with the parents, and consequences occur which humanity shudders to contemplate."

Our readers will probably by this time have arrived with us at the conclusion, that there exists no "*savage*" nation on earth in which more uncivilized or more demoralizing scenes could be witnessed than in the heart of this great country. Should however any doubts remain, we will subjoin one short extract from the evidence of Dr. Scott Alison:—

"In many houses in and around Tranent, fowls roost on the rafters and on the tops of the bedsteads. The effluvia in these houses are offensive, and must prove very unwholesome. It is scarcely necessary to say that these houses are very filthy. They swarm likewise with fleas. Dogs live in the interior of the lowest houses, and must, of course, be opposed to cleanliness. I have seen horses in two houses in Tranent inhabiting the same apartment with numerous families. One was in Dow's Bounds. Several of the family were ill of typhus fever, and I remember *the horse stood at the back of the bed.* In this case the stench was dreadful. The father died of typhus on this occasion."

One fatal consequence of the want of ventilation in the houses and workshops in which our labouring classes are too often confined, is the disposition it creates among them to dispel by drink that depressing effect on their nervous energies, which is invariably the result of breathing *impure air.* In Dumfries, for example, where the cholera swept away one-eleventh of the population, Mr. Chadwick inquired of the chief magistrate, "How many bakers' shops there were?" "Twelve," was the answer. "And how many whisky-shops may your town possess?" The honest Provost frankly replied, "*Seventy-nine!*" Another consequence is the rapid corruption, in such unwholesome air, of meat, bread, and other food, which, by preventing the poor from laying in any store, forces them to purchase their provisions on the most disadvantageous terms.

"Here, then," says Mr. Chadwick, "we have from the one agent (a close and polluted atmosphere) two different sets of effects: one set here noticed engenderihg improvidence, ex-

pense, and waste—the other, the depressing effects of external and internal miasma on the nervous system, tending to incite to the habitual use of ardent spirits; both tending to precipitate this population into disease and misery."

In lamenting over the picture, but too clearly delineated, of the demoralization and disorganization of our labouring classes, caused by the removal of those domestic barriers by which Nature, even among savages, protects modesty and encourages decency, Mr. Chadwick maintains that no education, as yet given, appears to have availed against such corrupting circumstances: whereas, *per contrà*, he cites numerous instances of the moral improvement of a population from street-cleansing, land-draining, and alterations in the external and internal condition of their dwellings. Indeed it is but too clear, that it is mere mockery to talk of elevating by *education*, classes whom we allow to be perpetually acted upon by physical circumstances, of deeply degrading tendency, which we neglect to remove. How striking are these words of Mr. Walker, the magistrate of the Thames Police Office, who, after deprecating the practice of building for the poor miserable hovels, instead of comfortable and respectable, well-drained, well-ventilated dwellings, says:—

"From what I have observed, I am fully convinced that if shambles were built upon any spot, and all who choose were allowed to occupy them, they would soon be occupied by a race lower than any yet known. I have often said, that if empty casks were placed along the streets of Whitechapel, in a few days each of them would have a tenant, and these tenants would keep up their kind, and prey upon the rest

of the community. I am sure that, if such facilities were offered, there is no conceivable degradation to which portions of the species might not be reduced. Wherever there are empty houses which are not secured, they are soon tenanted by wretched objects, and these tenants continue so long as there is a harbour for them. Parish-officers and others come to me to aid them in clearing such places. I tell the police and the parish that there is no use in *watching* these places; that they must board them up, if they would get rid of the occupants. If they will give the accommodation, they will get the occupants. If you will have marshes and stagnant waters, you will there have suitable animals; and the only way of getting rid of them is by draining the marshes."

Mr. Chadwick, with great force, dwells on *domestic* mismanagement generally, as one great predisposing cause of disease. He shows that the poor are in the habit of buying their tea, coffee, sugar, butter, cheese, bacon, and other articles, in small quantities from the hucksters, who, to cover bad debts, charge exorbitant prices. Destitution is often, therefore, caused by the wasteful misapplication of wages, which, with habits of frugality, would prove to be sufficient; but the grand evil is, that every species of mismanagement promotes or ends in *gin and whisky*.

Every day "intemperance" is talked of, and preached against, as the cause of fever, and of the prevalent mortality. And yet we neglect to reflect that it is the *discomfort* of the poor that drives them to drink. Rival pleasures might be encouraged, which would keep them sober; but, alas! whisky is but too often declared to be *good* for damp and rheumatism, when drain-

age and a clean well ventilated residence are really the physical remedies that should be prescribed.

IV. *Comparative chance of life in different classes of the community.*

There is no fallacy more generally admitted than that "Death is no respecter of persons." Mr. Chadwick, however, has drawn from the mortuary registers a series of tabular returns, of which the following is a single specimen:—

No. of Deaths.	Liverpool, 1840.	Average Age of Deceased.
137	Gentry and professional persons, etc.	35
1,738	Tradesmen and their families	22
5,597	Labourers, mechanics, and servants, etc.	15

Again, it is an appalling fact, that, while among the labouring classes in Manchester, more than fifty-seven out of every hundred die before they attain five years of age, *one-fifth* only of the children of the gentry die within the same period! In explanation of such a difference, Mr. Chadwick has annexed to his Report plans of several towns, showing, by different tints, that the localities of the epidemic diseases which raged there are identical with the uncleansed and close streets and wards occupied by the poor.

Instead of searching for the real causes which have been so fatally shortening, as well as embittering, the existence of our labouring classes, it has of late years been much the fashion among political economists to declare that wars, plagues, pestilence, epidemic dis-

orders, and accidents of every description, which cause premature deaths among the poor, are, if it could but be satisfactorily explained to them, a "corrective," kindly ordained by Nature, in order to prevent population exceeding the means of subsistence. But Mr. Chadwick, as the advocate of Nature, and of the poor, not only denies this Malthusian doctrine altogether, but produces tabular accounts taken from the bills of mortality of every county in England, which certainly appear to prove that the proportion of births to the population is greatest where there is the greatest mortality,—and consequently, that pestilence or excessive mortality does not diminish the sum-total of population! And thus, although our mismanagement produces disease, which makes a gap, Nature immediately labours to fill it up. For instance, in almost every trade and profession of life, the young must almost unavoidably defer marriage until their seniors vacate by death the places of trust and confidence which they have gradually attained. So long, therefore, as these places linger in the possession of the old, the increase of population is proportionally subdued; whereas, on the other hand, if, from avoidable or unavoidable disease, the duration of life be so shortened that those *loca tenentes*, who neither increase nor multiply, shall be either partly or wholly replaced by those of an age to do both, it evidently follows that this description of mortality must produce more births than deaths.

From like causes, the returns of the deaths, marriages, and births, among the White population on the

west coast of Africa demonstrate that, though the mortality there has been frightful, the births have exceeded it largely:—for example, in the different districts of this pestilential abode the number of deaths (nine-tenths of which were of persons under forty years of age) amounted in 1839 to 241, while, in the same year, the number of baptisms was 464, and the number of marriages 542; indeed it seems natural that young people should become reckless of consequences, and regardless of the future, in a climate which, by the ravages it is daily creating, appears always to be relentlessly exclaiming to them, "*TO-MORROW YOU DIE!*"

V. *Pecuniary burdens created by the neglect of sanitary measures.*

"To whatever extent," says Mr. Chadwick, "the probable duration of the life of the working man is diminished by noxious agencies, I repeat a truism in stating that to the same extent productive power is lost; and in the case of destitute widowhood and orphanage, burdens are created and cast, either on the industrious survivors belonging to the family, or on the contributors to the poor's-rates, during the whole of the period of the failure of such ability."

It appears that the number of widows chargeable to the poor-rates in the year ending Lady-day, 1840, was 43,000, and that the total number of orphan children to whom relief was given was 112,000. Of these it is estimated that 27,000 cases of premature widowhood, and more than 100,000 of orphanage, might be traced to removable causes.

Take one pleasing example of a *cause removed*:—

"In one mine," says Dr. Barham, "the Dalcoath mine, in the parish of Camborne, in Cornwall, great attention is paid to obviate agencies injurious to the miners. Care is there taken in respect to ventilation in the mines, and the men are healthier than in most other mines; there are more old miners. Care is taken for the prevention of accidents. Care is taken of the miners on quitting the mines: hence, instead of issuing on the bleak hill-side, and receiving beer in a shed, they issue from their underground labour into a warm room, where well-dried clothes are ready for them; warm water, and even baths, are supplied from the steam-furnace; and a provision of hot beef-soup instead of beer is ready for them in another room. The honour of having made this change is stated to be due to the Right Hon. Lady Basset, on the suggestion of Dr. Carlyon. We may fairly attribute to the combination of beneficial arrangements just noticed that in Dalcoath, where 451 individuals are employed underground, only two have died within the last three years of miners' consumption; a statement which could not, I believe, be made with truth, nor be nearly approached, in respect of an equal number of miners during the same term in any other Cornish district. The sick-club of the mine is comparatively rich, having a fund of £1500."

It appears to be the governing principle of Mr. Chadwick's Report to demonstrate to the public that the welfare of the labouring poor is identical with that of all other classes:—that whatever afflicts the former, sympathetically affects the latter:—and consequently that whenever the poor are brought to an untimely grave by causes which are removable, the *community* in some way or other is sure to suffer retributive punishment for the neglect. For example—in corrobation of the evidence already adduced—he gives tabular returns, showing the

difference in the proportions of ages between a depressed and unhealthy, and a comparatively vigorous population: by which it appears that, while in a hundred men of the former, there would not be two men beyond 60 years of age, not eight above 50, and not a fourth above 40;—in the other population there would be fourteen beyond 60, twenty-seven beyond 50, or a clear majority of mature age. Now mark *one* important consequence:—

"Whenever the adult population of a physically depressed district, such as Manchester, is brought out on any public occasion, the preponderance of youth in the crowd is apt to strike those who have seen assemblages of the working population in districts more favourably situated.

"In the course of some inquiries under the Constabulary Force Commission, reference was made to the meetings held by torchlight in the neighbourhood of Manchester. It was reported that the bulk consisted of mere boys, and that there were scarcely any men of mature age amongst them. Those of age and experience, it was stated, generally disapproved of the proceedings of the meetings, as injurious to the working classes themselves. These older men, we were assured by their employers, were above the influence of the anarchical fallacies which appeared to sway those wild and dangerous assemblages. The inquiry which arose upon such statements was how it happened that the men of mature age, feeling their own best interests injured by the proceedings of the younger portion of the working classes—how they, the elders, did not exercise a restraining influence upon their less experienced fellow-workmen? On inquiring of the owner of some extensive manufacturing property, on which between 1000 and 2000 persons were maintained at wages yielding 40*s.* per week per family, whether he could rely on the aid of the men of mature age for the protection of the capital which furnished them the means

of subsistence,—he stated he could rely on them confidently; —but on ascertaining the numbers qualified for service as special constables, the gloomy fact became apparent, that the proportion of men of strength and of mature age for such service were but as a small group against a large crowd, and that for any social influence they were equally weak. The disappearance by premature deaths of the heads of families and the older workmen must practically involve the necessity of supplying the lapse of staid influence amidst a young population by one description or other of precautionary force.

"On expostulating on other occasions with middle-aged and experienced workmen on the folly, as well as the injustice, of their trade unions, the workmen of the class remonstrated with invariably disclaimed connection with the proceedings, and showed that they abstained from attendance at the meetings. The common expression was, they would not attend to be borne down by 'mere boys,' who were furious, and knew not what they were about. The predominance of a young and violent majority was general.

"In the Metropolis the experience is similar. The mobs against which the police have to guard come from the most depressed districts; and the constant report of the Superintendent is, that scarcely any old men are to be seen amongst them. In general they appear to consist of persons between sixteen and twenty-five years of age. The mobs from such districts as Bethnal Green are proportionately conspicuous for a deficiency of bodily strength, without, however, being from that cause proportionately the less dangerously mischievous. I was informed by peace-officers that the great havoc at Bristol was committed by mere boys."

Since the publication of the Report alarming riots have occurred in the manufacturing districts; and our readers will observe, from the following authentic de-

tails, which we have taken some trouble to obtain, how singularly Mr. Chadwick's statement has just been corroborated :—

"*Ages of the Prisoners for Trial at the Special Commission in Cheshire, Lancashire, and Staffordshire, October*, 1842 :—

Below	16	13
Between	16 and 26	316
	26 and 36	154
	36 and 46	56
	46 and 56	18
	56 and 66	5
Above	66	3
		565

Moreover it must be kept in mind that these prisoners were the *leaders;* their followers were probably much younger.

"The experience of the Metropolitan Police," continues Mr. Chadwick, 'is similar as to the comparatively small proportion of force available for public service from such depressed districts. It is corroborative also of the evidence as to the physical deterioration of their population, as well as the disproportion in respect to age. Two out of every three of the candidates for admission to the Police force itself are found defective in the physical qualifications. It is rare that any one of the candidates from Spitalfields, Whitechapel, or other ill-ventilated districts where the mean duration of life is low, is found to possess the requisite physical qualifications for the force, which is chiefly recruited from the open districts at the outskirts of the town, or from Norfolk and Suffolk, and other agricultural counties.

"In general the juvenile delinquents, who came from the

inferior districts of the towns, are conspicuously under-size. In a recent examination of juvenile delinquents at Parkhurst by Mr. Kay Shuttleworth, the great majority were found to be deficient in physical organization. An impression is often prevalent that the criminal population consists of persons of the greatest physical strength. Instances of criminals of great strength certainly do occur; but, speaking from observation of the adult prisoners from the towns and the convicts in the hulks, they are in general below the average standard of height."

Mr. Chadwick follows up these statements by some very curious details collected from the teachers of the pauper children at Norwood and elsewhere:—

"The intellects of the children of inferior physical organization are torpid; it is comparatively difficult to gain their attention or to sustain it; it requires much labour to irradiate the countenance with intelligence, and the irradiation is apt to be transient. As a class they are comparatively irritable and bad-tempered. The most experienced and zealous teachers are gladdened by the sight of well-grown healthy children, which presents to them better promise that their labours will be less difficult and more lasting and successful. On one occasion a comparison was made between the progress of two sets of children in Glasgow—the one set taken from the wynds and placed under the care of one of the most skilful and successful infant-school masters; the other a set of children from a more healthy town district, and of a better physical condition, placed under the care of a pupil of the master who had charge of the children from the wynds. After a trial for a sufficient time, the more experienced master acknowledged the comparative inferiority of his pupils, and his inability to keep them up to the pace of the better bodily-conditioned children."

Our author pithily sums up the result:—

"Noxious physical agencies, depressing the health and bodily condition of the population, act as obstacles to education and to moral culture; in abridging the duration of adult life they check the growth of productive skill, and abridge the amount of social experience and steady moral habits: they substitute for a population that accumulates and preserves instruction, and is steadily progressive, a population young, inexperienced, ignorant, credulous, irritable, passionate, dangerous, having a perpetual tendency to moral as well as physical deterioration."

VI. *Evidence of the effects of preventive measures in raising the standard of health and the chances of life.*

The results of measures which have lately been introduced into the Army and Navy, as well as into our prisons, offer highly interesting evidence of the health attainable by simple means. And yet Mr. Chadwick declares that no descriptions given by Howard of the worst prisons he visited in England come up to what appeared in every wynd of Edinburgh and Glasgow inspected by Dr. Arnott and himself. On what principle, therefore, can we defend our not applying to the benefit of the labouring poor measures which we know to have saved so many of our soldiers and sailors—and therefore saved the nation such vast sums of money? Above all, what is to be said of the judgment of a community that makes prodigious efforts to improve the sanitary condition of its criminals, and yet apathetically neglects to purify for its poor the foul air they live in?

After giving us a mass of irresistible evidence as to the beneficial results of increased care in the case of

soldiers and sailors, and the inmates of gaols, Mr. Chadwick proceeds to compare the cost to owners and tenants of the public drainage, cleansing, and supplies of water necessary for the maintenance of health, with the expense of sickness;—in short, he compares the cost of the prevention with the cost of the disease. From his tables it appears that the cost of the application of his remedies to one-third (1,148,282) of the inhabited houses in England, Wales, and Scotland, would amount to £18,401,219. Out of this sum, however, the supplying every house with water, even at the highest charge made by the Water Companies, namely, 138 pailfulls for 1¼*d.*, would, of course, be a reduction of the existing expenditure of labour in fetching water; and many other similar reductions should be made from the account. But, without lingering over such details, it may be at once stated that our experience of the effects of sanitary measures proves the possibility of the reduction of *sickness* in the worst districts to at least one-third of the existing amount; and sickness is no trifle in the calculation of mere pounds, shillings, and pence.

"The *immediate* cost," says Mr. Chadwick, "of sickness and loss of employment falls differently in different parts of the country; but on whatsoever fund it does fall, it will be a gain to apply to the means of prevention that fund which is and must needs otherwise continue to be more largely applied to meet the charge of maintenance and remedies.

"By an estimate which I obtained from an eminent spirit-merchant of the cost to the consumer of the British spirits on which duty is paid, the annual expenditure on them alone, chiefly by the labouring classes, cannot be less than £24,000,000

per annum. The cost of one dram per week would nearly defray the expense of the structural arrangements of drainage, etc., by which some of the strongest provocatives to the habit of drunkenness would be removed."

These are most important statements. Nevertheless it must be remembered, that the labouring poor in our great towns cannot of themselves, as a class, improve essentially the condition of the localities they occupy. The workman's location must be governed by his work—therefore the supply of house-room for him becomes almost inevitably a monopoly: he must not only take a lodging near his work, but he must take it as it is: he can neither lay on water, nor cause the removal of filth by drainage; in short, he has no more control over the external economy of his habitation than of the structure of the street in which it exists. Yet, it is demonstrable that, if the employers of labour would but provide better accommodation for their labourers, they would receive in money and in money's worth—to speak of no higher considerations—a fair remuneration for their expenditure.

"We everywhere find," says Mr. Chadwick (in contradiction to statements frequently made in popular declamations), "that the labourer gains by his connection with large capital: in the instances presented in the course of this inquiry, of residences held from the employer, we find that the labourer gains by the expenditure for the external appearance of that which is known to be part of the property—an expenditure that is generally accompanied by corresponding internal comforts: he gains by all the surrounding advantages of good roads and drainage, and by more sustained and powerful care to maintain them: he gains by the closer proximity to his work attendant on such

an arrangement; and he thus avoids all the attacks of disease occasioned by exposure to wet and cold, and the additional fatigue in traversing long distances to and from his home to the place of work, in the damp of early morning or of nightfall. The exposure to weather after leaving the place of work is one prolific cause of disease, especially to the young. When the home is near to the place of work, the labourer is enabled to take his dinner with his family instead of at the beer-shop. The wife and children gain by proximity to the employer's family, in motives to neatness and cleanliness, by their being known and being under observation: as a general rule, the whole economy of the cottages in bye-lanes and out-of-the-way places appears to be below those exposed to observation. In connection with property or large capital, the labourer gains in the stability of employment, and the regularity of income incidental to operations on a large scale: there is a mutual benefit also in the wages for service being given in the shape of buildings or permanent and assured comforts; that is, in what would be the best application of wages, rather than wholly in money wages."

We must refer to the Report itself for a long array of most pleasing proofs of the practical truth of these statements. Indeed, not a few of the great master-manufacturers acknowledged to Mr. Chadwick that what they had done from motives of humanity had turned out, to their agreeable surprise, immensely advantageous to their own purses. For instance:—

"The effects," says Mr. Fairburn, speaking of Leeds, "produced by payment at the public-house are to oblige the workman to drink. He is kept waiting in the public-house during a long time, varying from two to three hours, sometimes as much as five hours. The workman cannot remain in the house without drinking, even if he were alone, as he must make some return to the landlord for the use of the room. But the pay-

ment of a number of men occupies time in proportion to their numbers. We find that to pay our own men in the most rapid way requires from two to three hours. The assembled workmen of course stimulate each other to drink. Out of a hundred men, all of whom will, probably, have taken their quart of porter or ale, above a third will go home in a state of drunkenness—of drunkenness to the extent of imbecility. The evil is not confined to the men; the destructive habit is propagated in their families. At each public-house a proportion of the poor women, their wives, attend. According to my own observation full ten per cent. of the men have their wives and children in attendance at the public-house. The poor women have no other mode of getting money, to market with on the Saturday night, than attending at the public-house to get it from their husbands. They may have children whom they cannot leave at home, and these they bring with them. The wives are thus led to drink, and they and their children are made partakers of the scenes of drunkenness and riot; for there are not unfrequently quarrels, leading to fights, between the workmen when intoxicated.

"It is only the inferior shopkeepers, or hucksters, who will sell on the Sunday morning, and they sell an inferior commodity at a higher price. Then the Sunday morning is thus occupied: the husband, and sometimes the wife, is kept in a state of feverish excitement by the previous night's debauch; they are kept in a state of filth and disorder; even the face is unwashed; no clean clothes are put on; and there is no church attendance, and no decency. Indeed, by the pressure of the wants created by habits of drinking, there is soon no means to purchase clean or respectable clothes, and lastly no desire to purchase them. The man, instead of cleaning himself, and appearing at church on the Sunday, or walking out with his family on the Sunday afternoon in a respectable condition, remains at home in filth, and in a filthy hovel."

"The workman who has been absent from drunkenness comes to his work pale, emaciated, shattered, and unnerved. From my own observation in my own branch of manufacture, I should say that the quantity and quality of the work executed during the first day or so would be about one-fifth less than that obtainable from a steady and attentive workman. Another consideration for the master is the fact that such workmen, the most idle and dissolute, are the most discontented, and are always the foremost in mischievous strikes and combinations."

Now what is Mr. Fairburn's simple prescription for these complicated disorders? He sends a clerk into every room in his manufactory, immediately after dinner-hour on Saturday, to pay each man individually, who, by this simple arrangement, is not taken from his work half a minute. The master thus saves on an average an hour and a half's labour of 550 men, which amounts to 800 hours of labour per week; one great cause of non-attendance at church on the Sunday is abolished; and, lastly, not above four or five of his people arrive late at their work on Monday morning.

Let us turn for a moment to the rural regions. Out of many of Mr. Chadwick's witnesses, let us attend to one:—Charles Higgins, Esq., Chairman of the Bedford Union, thus describes the advantages which have arisen from an improved description of cottages in his vicinity:—

"The man sees his wife and family more comfortable than formerly; he has a better cottage and garden; he is stimulated to industry; and, as he rises in respectability of station, he *becomes aware* that he has a character to lose. Thus an important point is gained. Having acquired certain advantages, he is anxious to retain and improve them; he strives more to

preserve his independence, and becomes a member of benefit, medical, and clothing societies; and frequently, besides this, lays up a certain sum, quarterly or half-yearly, in the savings-bank. Almost always attendant upon these advantages, we find the man sending his children to be regularly instructed in a Sunday, and, where possible, in a day school, and himself and family more constant in their attendance at some place of worship on the Lord's-day.

"A man who comes home to a poor, comfortless hovel after his day's labour, and sees all miserable around him, has his spirits more often depressed than excited by it. He feels that, do his best, he shall be miserable still, and is too apt to fly for a temporary refuge to the ale-house or beer-shop. But give him the means of making himself comfortable by his own industry, and I am convinced by experience that, in many cases, he will avail himself of it."

Although, in the variegated picture of human life, one can scarcely point out a more striking contrast than between a pale drunken labourer zigzaggedly staggering by night from the alehouse to his family, and a ruddy sober one rationally enjoying his evening at home; yet it is not so very easy to analyze and enumerate the invisible filaments which, acting all together like the strands in a cable, have in the two cases produced such opposite results!

It is not *solely* the fresh air the ploughman has been inhaling all day which, at the conclusion of his work, has irresistibly brought him to his home; nor is it the appetite which healthy labour has created; nor is it the joyous welcome of those rosy-faced children who, following each other almost according to their ages along the garden-path, have run to meet him at his wicket-gate;

nor is it the smiling countenance of his neatly-dressed wife; nor the homely meal she has prepared for him; nor the general cleanliness of his cottage; nor the ticking of his gaudy-faced clock; nor the merry antics of his children's kitten; nor his warm chimney-corner; nor the cheerful embers on his hearth;—no *one* of these tiny threads would have proved strong enough to draw an able-bodied labourer to his cottage; and yet, their united influence, though still invisible to him, have produced the happy result: in short, they have created health, and health happiness.

On the other hand, it is not *solely* the fountain of putrid air which all day long has been steaming up from a small gully-drain in front of his shop, that causes the workman to spend his evening at the alehouse; nor is it the lassitude of his body, or depression of spirits produced by the want of ventilation in the building; nor is it the dust he has been breathing there; nor is it the offensive open drain that runs close under his own window; nor is it the sickly, uncaptivating aspect of his careworn wife; nor the neglected, untidy appearance of his room; nor the emaciated countenances of his poor children, who, as if they had lost the bloom of modesty, are lying all huddled together in one bed; nor is it the feverish thirst which assails him; nor is it that black, unwholesome board nailed by Parliament over the alehouse door, which insists that the beer he thirsts for is "*to be drunk on the premises*," or, in other words, that he himself must be the legislative pitcher that is to carry it away; nor is it the abandoned, immoral associates of

both sexes which this board has convened for him;—no *one* of these circumstances would be sufficient to estrange an honest workman from his home; and yet, when they give "a long pull, a strong pull, and a pull all together," the victim obeys their influence, he knows not why, and accordingly, however crooked may be his path homewards, he, at all events, goes straight to the alehouse.

We have no desire to lecture against the old law which, in order to save trouble and reflection, summarily prescribed punishment as the natural and only cure for drunkenness. We trust however that the day is fast approaching when the attention of our law-makers will be directed to the prevention of the evil, instead of its cure; for if it be true that the sobriety of the labouring classes mainly depends upon sanitary arrangements on an extensive scale, which the *fiat* of Parliament could instantaneously ordain, it certainly does appear that, so long as this branch of legislation shall continue to be neglected, there is reason to doubt whether Parliament or the peasant be the most guilty of those cases of drunkenness which mainly proceed from a series of minute causes removable by the former, but not by the latter.

In fact, it is undeniable that Mr. Chadwick's main remedies, namely efficient drainage, sewerage, and ablution of towns, come within the legitimate province of the Legislature. That the interior arrangements he proposes, such as the *ventilation* of all buildings in which a body of workpeople are assembled, as well as due attention to a series of other details conducive to their health, are, to say the least, as much within the proper jurisdic-

tion of Parliament as the most humane mode of sweeping chimneys, or the proper thickness of party-walls. The health of the nation being nearly synonymous with its wealth, it is evident that the labouring power of the British people is a machine which it is the duty as well as the interest of the State to protect.

In France there has long existed a *Board of Health;* and whoever has read the Essays of Parent du Châtelet must know of what vast benefits this institution has been productive. Many times has a similar one been recommended and proposed here, but there has always occurred some fatal hitch. Meantime Mr. Chadwick submits that the machinery of the Poor-Law Commission might be rendered highly serviceable; and his practical proposal is that, in order to establish throughout the country an efficient system of sanitary attention, there should be appointed to each district two new superior officers, a superintending Physician and a skilful Engineer.

Mr. Chadwick truly observes that the claim to relief on the ground of destitution created by sickness, already propels the medical officer of every Union to the precise point where the evil is most rife, and where the public intervention is most called for, namely to the interior of the abode of the sufferer; indeed it appears that in the Metropolis during one year these officers were required to visit 14,000 residences of applicants for relief on account of fever alone. And when it is considered that the number of medical officers attached to the new Unions throughout the country amounts to 2300, it is

evident what a searching professional inquiry these intelligent agents have power to make, as also what opportunities they would have of recommending immediate attention to whatever physical causes of disease they might discover in their daily visits to the residences of the afflicted. It is equally obvious that the relieving officer of the Union would, in the mere performance of his duty, be able to assist the medical officer in searching out removable causes of sickness, by reporting whatever he might deem worthy of attention.

In order therefore to carry out this reciprocal assistance, Mr. Chadwick proposes that the medical officers of the Unions, whenever they visit the residences of the labouring classes, should be required, as an extra duty for which they should be properly remunerated, to examine, or order to be examined, any physical and removable causes which may, in their opinion, have produced disease; and having done this, to make out a report, specifying any nuisances that may require immediate removal, which statement should then be given to the relieving officer, who should thereupon take measures for the removal of the nuisance at the expense of the owner of the tenement, unless he, upon notice being given to him, forthwith proceeds to direct its removal.

These preliminary arrangements being effected, the duty of the district physician would be to receive reports from the medical officers of the Unions, and to give general supervision to their labours, so as to correct any error or neglect in their treatment of the destitute; to inspect from time to time the schools of the poor; and

to visit in person also places of work and workmen's lodging-houses,—in this last department advantageously superseding the sub-inspectors of factories.

"It would be found," says Mr. Chadwick, "that the appointment of a superior medical officer, independent of private practice, to superintend these various duties, would be a measure of sound pecuniary economy. The experience of the navy and the army and the prisons may be referred to for exemplifications of the economy in money, as well as in health and life, of such an arrangement. A portion only of the saving from an expensive and oppressive collection of the local rates would abundantly suffice to ensure for the public protection against common evils, the science of a district physician, as well as the science of a district engineer. Indeed the money now spent in comparatively fragmentitious and unsystematized local medical service for the public, would, if combined as it might be without disturbance on the occurrence of vacancies, afford advantages at each step of the combination. We have in the same towns public medical officers as inspectors of prisons, medical officers for the inspection of lunatic asylums, medical officers of the new Unions, medical inspectors of recruits, medical service for the granting of certificates for children, under the provisions of the Factory Act, medical service for the *post-mortem* examinations of bodies, the subject of coroners' inquests, which, it appears from the mortuary registries of violent deaths in England, amount to between 11,000 and 12,000 annually, for which a fee of a guinea each is given. These and other services are divided in such portions as only to afford remuneration in such sums as £40, £50, £60, or £80 each; and many smaller and few larger amounts."

But after all that may justly be said in favour of medical assistance, Mr. Chadwick evidently considers that the chief physician of his sanitary system is the

district engineer. We have many engineers at work, but no real good can be effected on a large scale unless there be *system* in the operations, and authority extending over more than this or that small object or locality.

"In the districts," says Mr. Chadwick, "where the greatest defects prevail, we find such an array of officers for the superintendence of public structures, as would lead to the *à priori* conclusion of a high degree of perfection in the work, from the apparent subdivision of labour in which it is distributed. In the same petty districts we have surveyors of sewers appointed by the Commissioners of Sewers; surveyors of turnpike-roads appointed by the Trustees of the Turnpike-trusts; surveyors of highways appointed by the inhabitants in vestry, or by district boards under the Highway Act; paid district surveyors appointed by the Justices; surveyors of paving under local Acts; surveyors of building under the Building Act; surveyors of county-bridges, etc.

"The qualifications of a civil engineer involve the knowledge of the prices of the materials and labour used in construction, and also the preparation of surveys and the general qualifications for valuations, which are usually enhanced by the extent of the range of different descriptions of property with which the valuator is conversant. The public demands for the services of such officers as valuators are often as mischievously separated and distributed as the services for the construction and maintenance of public works. Thus we have often, within the same districts, one set of persons appointed for the execution of valuations and surveys for the levy of the poor-rates; another set for the surveys and valuations for the assessed taxes; another for the land-tax; another for the highway-rates; another for the sewer-rates; another for the borough-rates; another for the church-rates; another for the county-rates, where parishes neglect to pay, or are

unequally assessed, and for extraparochial place; another for tithe-commutation: and these services are generally badly rendered separately at an undue expense."

On comparing the actual expense of the repairs of roads under a scientific management of the highways with the present cost, Mr. Chadwick estimates, that upwards of £500,000 per annum might be saved on that branch of administration alone. In the collection of the county-rates, he considers that, by simple arrangements, £1000 a year might be saved in one county (Kent), sufficient for defraying the expense of constructing permanent drains for upwards of five hundred tenements; and, from a vast accumulation of similar data, Mr. Chadwick states, as his deliberate opinion, that, by a consolidation of the collection of rates, enough might be saved from the collection of one local tax—the sewers-rate—to pay the expense of scientific officers throughout the country.

"Supposing," he says, "population and new buildings for their accommodation to proceed at the rate which they have hitherto done in the boroughs, and supposing all the new houses to be only fourth-rate, the expense, at the ordinary rate of payment of surveyors' fees, would be about £30,000 per annum for the new houses alone. Fees of half the amount required for every new building are allowed for every alteration of an old one, and the total expense of such structure would probably be near £50,000 in the towns alone—an expense equal to the pay of *the whole corps of Royal Engineers*, or two hundred and forty men of science, for Great Britain and Ireland.

"But at the rate of increase of the population of Great

Britain, to accommodate them, 59,000 new tenements are required, affording, if all that have equal need receive equal care, fees to the amount of no less than from £80,000 to £100,000 per annum. This would afford payment equal to that of the whole corps of Sappers and Miners, or nearly 1000 trained men, in addition to the corps of Engineers.

"From a consideration of the science and skill now obtained for the public from these two corps for general service, some conception may be formed of the science and skill that might be obtained in appointments for local service, by pre-appointed securities for the possession of the like qualifications, but which are now thrown away in separate appointments at an enormous expense, where qualifications are entirely neglected."

If, when our carriage is broken, we send it to the coachmaker,—if, when our chronometer stops, we take it to the watchmaker, and so on,—it surely follows that when patches of fever are found vegetating in all directions around us;—when pestilence of our own concocting, like an unwholesome mist, is rising out of the burial-grounds, courts, alleys, and *culs-de-sac* of our towns, and out of the undrained portions of the country;—and when every parish-purse throughout the kingdom is suffering from the unnatural number of widows and orphans, which, in consequence of these removable causes, it is obliged by law to maintain;—in short, when sanitary measures are at last proved to be economical,—there can surely exist among reasonable men no doubt that the physician and the engineer are the head and the hand professionally most competent to undertake the cure. So long as we could affect to be igno-

rant of the evils that environ us, it was deemed unnecessary to send for either; but from the day of the publication of the evidence before us, this excuse, like a poisonous weed plucked from the ground, must now wither.

Even if the amount of removable mischief by which we are surrounded were a fixed quantity, it surely ought to create among us very serious alarm; but, on the contrary, every day it is becoming more and more formiddable. The sea-beaten shores of Great Britain remain unaltered, yet the population within them is already increasing at the rate of 230,000 persons per annum. In the year therefore that has just closed, people enough to fill a whole county of the size of Worcestershire, or of the North Riding of Yorkshire, have been poured upon us; and every progressive year the measure of increase will become larger.

What is to be the result of such an increasing addition to our population it is awful enough, under any circumstances, to contemplate; but if every living individual—"*de mortuis nil nisi bonum*"—be allowed to continue to pollute the air, our commonwealth, as much as he pleases; if pollution be allowed to continue to engender disease;—disease, demoralization;—and deralization, mutiny, and rebellion by a young mob,—the punishment of our apathy and negligence, sooner than we expect it, may become, like that of Cain, GREATER THAN WE CAN BEAR.

We cannot take leave of Mr. Chadwick without ex-

pressing our high sense of the energy with which he has conducted this all-important investigation, the benevolent feeling towards the poor and the suffering which has evidently animated and sustained him in his long labours, and the sagacity which distinguishes his leading suggestions.

Memorandum on Mr. Alison's Statement that on the 15th, 16th, 17th, and 18th of June, 1815, the Duke of Wellington and Marshal Blucher were "Surprised, Out-manœuvred, and Out-generaled" by Napoleon.

When two armies or fleets, completely separated, are preparing for collision, it is evident that the commander of each can only be responsible for all that exists within the radius of his own power.

For instance, in the year 1805, when France was preparing to invade England, Napoleon could no more prevent the English from raising volunteer regiments, making pikes and muskets at Birmingham, gunpowder at Hounslow, and from casting shot and cannon at Woolwich, than King George III. could prevent the French people from obeying the conscription, or from making ball-cartridges at Paris. But out of the preparations for war, which at the period alluded to were carrying on on either side of the Channel, if there could be selected any one which above all the rest the opposite country had not the slightest power to influence, it was the amount of secrecy with which each Government was enabled to veil its transactions, from the knowledge of the other. And thus, if Napoleon had thought proper to keep his

projected plan of attack concealed in his own breast, and if, by means of a police and gendarmerie of his own creation, he had been able to establish an embargo strong enough to stop up every crevice of communication, King George III. would have been no more to blame for the exercise of this power than Napoleon would have been to blame for the fogs which, proceeding from causes he had no power whatever to control, frequently concealed England from his view. In short, until the two nations came into open collision, to blame either Government for the internal arrangements of the other, would be as absurd as to blame a nobleman who has a colt to run at the next Derby for the care and attention daily bestowed throughout the country on all the colts with which his is about to contend.

Now while the truth of this reasoning is before the mind, let us for a moment calmly apply it to Mr. Alison's remarks on the position which the Duke of Wellington occupied immediately before the Battle of Waterloo.

It is an historical fact which cannot be denied (indeed, having been quartered at Charleroi at the time, we witnessed it,) that at daybreak on the morning of the 15th, the Allied army, under the command of the Duke of Wellington, was at that point suddenly attacked in its cantonments by the French army, headed by Napoleon, who by this unexpected movement obtained the military advantage of encountering separately the Prussian army on the afternoon of the 16th at Fleurus, and the English army on the morning of the 18th at Waterloo, before these two forces could combine together against him as

they did at sunset on the 18th, *after* the two great battles alluded to had been fought.

Now granting to Napoleon for this dexterous *coup-de-main* the highest praise his most ardent admirers may declare to be his due, let us, with equal justice, consider how much blame, if any, belongs to the Duke of Wellington for having allowed himself, as Mr. Alison describes it, to have been "surprised, out-manœuvred, and out-generaled" by his antagonist.

There can be no doubt that, previous to the 15th of June, it was the desire of the Duke of Wellington that the Allied army should not be surprised, and that, on the other hand, it was the object of Napoleon to surprise it. It must, however, on the other hand also be admitted that it was impossible for the Duke to repel the attack of his adversary before it was made, or even to concentrate his forces in readiness to do so, until he knew at what degree of longitude Napoleon's attack upon the Allied army of observation was to be made; and as Napoleon, of course, would not himself tell him this important secret, the Duke could only learn it from others. Accordingly, in the beginning of June, 1815, he was not only ready, but exceedingly anxious, to receive the intelligence whenever it would deign in any way whatever to come to him; but he was *the receiver, not the donor*, and therefore, until the intelligence reached him, he could no more act upon it than a vessel becalmed under the Line can sail until the breeze approaching from the horizon has actually reached it. The Duke thirsted for the intelligence as the deserts of Africa after the dry season

thirst for the rain; but until what he desired came to refresh him, it is perfectly evident he could not receive it. In short, the intelligence of Napoleon's movements could not reach the territory of the Allied army until it had passed over a country under the arbitrary domination of Napoleon, and not under the authority of the Duke.

Now it may be, and it certainly is, very difficult indeed for any General to dam up every one of the many channels, large as well as small, by which intelligence flows and oozes from one country into another: but if, by the physical, military, and moral power which Napoleon possessed in his own territory, he was enabled to do so, his opponent is no more to blame for not having received intelligence which did not flow, than he would have been to blame for his territory not having received irrigation from a river which his opponent had had the power to divert.

Napoleon, by sovereign authority wielded with admirable skill, prevented the intelligence of his movements from preceding his attack upon the cantonments of the Allies; and Mr. Alison *therefore* affirms that the Duke of Wellington was "surprised:" and so he was. But why select the Duke of Wellington for blame? for *he* was no more surprised than were the Belgian peasantry of the Allied frontier, all of whom, though residing on the point attacked, were equally guilty of not knowing that which was unknown to the Duke of Wellington at Brussels. But not only were the inhabitants of the territory of the Allies kept by Napoleon in ignorance of his projected attack, but the *French* peasantry, occu-

pying the very ground from which the attack proceeded, were equally ignorant of it;—nay, the privates, non-commissioned officers, and officers of the *French* army, and even the French Generals, had not been gifted with power to communicate Napoleon's project to the Duke of Wellington, or to the Prussian General Zieten.

At the period in question it was well known that, not only in France, but in the ranks of the French army, there existed many Bourbonists, who in their hearts were opposed to Napoleon, and who, though enlisted under his colours, were faithless to his cause. Instead, therefore, of risking their lives in fighting against their consciences, there must have been, and indeed there were, many who would have deemed it a meritorious duty, as well as a most lucrative speculation, to have apprised the Allies of the intended attack; but Napoleon, who was well aware of this disaffection, so faithfully guarded his own secret, and was moreover so quick in his movements, that he actually prevented every one of those among his own soldiers who would willingly have betrayed him, from doing so.

The writer of this Memorandum, who, as an Officer of Engineers, was surveying the heights of Charleroi the morning it was attacked, was himself a witness to a most remarkable exemplification of this fact. He happened to be close to General Zieten about mid-day on the 16th of June, 1815, when the French Adjutant-General, Bourmont, who had just deserted, brought over to the Prussian army Napoleon's orders for its attack at two o'clock. In making this communication

to General Zieten, who was on horseback surrounded by all his staff, General Bourmont distinctly declared that he had all along intended to betray Napoleon, but that he had refrained from doing so until he could bring over to the Allies intelligence of importance.

Now all the while he was speaking, the Prussian army, ranged in position on the heights of Fleurus, could hear from the horizon a faint increasing sound of "*eur*" . . . "*pereur*" . . . "*EMPEREUR!*"—the distant cheers of the French army advancing to attack them. The Adjutant-General Bourmont, while he was addressing General Zieten, must therefore have known perfectly well that at *that* hour his intelligence of the intended attack, which, without metaphor, was speaking for itself, was of little or no value; whereas that had he apprised the Allied army on, say even the 14th, that Napoléon intended to attack Charleroi the following day, the intelligence would have been of inestimable value. General Bourmont however had deserted with all the information he could lay his hands on;—his disposition to betray was evident;—and accordingly he brought with him the lesser intelligence, only because Napoleon had effectually withheld from him the means of carrying away the greater. And if no one in Napoleon's army, from this Adjutant-General down to the shortest drummer-boy, had power to desert to the Allies with the valuable intelligence of Napoleon's intended advance upon Charleroi;—if the French peasantry on the frontier, intermingled by marriage with those in Belgium, had either no previous knowledge of the event, or found themselves

divested of all power of communicating it to their relations and friends residing in the territory of the Allies, —how could General Zieten and the Prussian army find it out? and above all, if *they* did not know it, by what miracle could the intelligence possibly have leaped over all their heads to the Duke of Wellington at Brussels?

No such miracle, however, was performed, and accordingly the English General did not hear of Napoleon's attack upon Charleroi until the intelligence by an ordinary, and not by a supernatural course, flowed to him. In short, the event was known at Charleroi before it was known at Brussels, just as every day in the year the sun rises at Liverpool before it rises at New York; and yet because Napoleon skilfully managed so long only as he remained within his own territory, over which the Duke of Wellington had no control, to keep his own secret, Mr. Alison jumps to the conclusion that by the exercise of this undisputed power he "out-manœuvred" and "out-generaled" his antagonist. Now, surely, before such high praise was awarded by an English historian to Napoleon for the quickness of his first movement, it should be recollected that it resulted in his complete defeat.

If, on the 15th of June, 1815, the Duke of Wellington had suddenly marched the Allied troops into France, and, attacking the French army in its position, had completely routed it, whatever credit might have been claimed for the English General, it ought, in common justice, and it *would* always have been urged in Napoleon's defence, that he had been attacked before he had

had sufficient time to collect materials of defence; in short, that he had been overpowered, but not out-generaled or "out-manœuvred." The case, however, was precisely reversed, for Napoleon was the projector of his own plan; or, in commoner words, with his own hands he himself spun the hemp and twisted the yarns of the rope with which he hanged himself.

But although the disposition of his own troops was veiled in darkness, the Duke of Wellington maintaining his position in broad daylight, the amount of the Allied army, as well as its organization, were no secrets. Napoleon therefore knew exactly where the British, Hanoverian, Belgian, Dutch, Prussian contingents were respectively cantoned;—as also the nature of the roads which separated them. He knew how the cavalry, infantry, and artillery of the Allies were disposed, and how many hours it would require to assemble them at any given point. He knew also where were the head-quarters of his opponent. With all these data before him he secretly calculated that, by springing unexpectedly upon the Prussian army, he would be enabled to attack it, and the British forces, separately, before they could have time to combine. This important part of his project, as we have shown, completely succeeded. Napoleon's own plan was therefore carried into effect, errors excepted, according to his own wishes; and yet, what, we ask, was the result of this game of chess of his own seeking? Why it was briefly as follows:—

On the 15th of June the Emperor Napoleon made the first move.

On the 16th, the Duke of Wellington said "*check*" to him at Quatre-Bras.

On the 17th, the two players stood in sullen silence looking at the board before them.

And on the 18th, at sunset, the Duke *checkmated* his antagonist, who, deeming himself completely beaten, of his own accord threw up the game and decamped.

But was this all? No. Not only was Napoleon's army so completely routed at Waterloo that it could never for a moment rally;—not only were its elements scattered to the winds never to meet again;—but Napoleon, still constituting himself supreme judge of his own case—still prescribing for his own wounds—decided on abdicating his title of Emperor, on descending from the throne of France, and lastly on proceeding to England in the 'Bellerophon,' to surrender himself to the Sovereign of his antagonist.

The remainder of his life was passed in captivity in a British island; he was buried in British soil, in which he remained for nineteen years, until the British Sovereign, in the month of September, 1840, magnanimously restored his mouldered bones to the French nation, 120,000 of whose soldiers he had gallantly, but so unsuccessfully, led to the attack of the Allied army on the 15th of June, 1815.

That his first movement on that day was rapid, and calculated to excite the enthusiasm of the French army, we most readily admit; but when the deadly results just detailed are simultaneously considered, it certainly appears strange that so able and eloquent a writer as

Mr. Alison should, in his history of this eventful period, aver that he "out-manœuvred the English General!"

If a French dragoon, with considerable activity and grimace, were unexpectedly to present the butt-end of his carbine at the breast of an English sentinel, and then pulling the trigger, were to blow his own brains out; would anybody in his senses say that this dragoon had out-manœuvred his red-coated enemy, merely because, galloping "*ventre à terre*" at him, his first movements had been quick ones?—and yet, such was precisely Napoleon's conduct.

If, instead of hurrying on an army of 120,000 men, newly assembled, unaccustomed to act together, unacquainted with their officers, and whom he had commanded in person *only one day*, to attack a cool and experienced antagonist, Napoleon had pursued a more cautious plan of defensive operations: if, for instance, he had thrown his troops into the line of frontier fortresses in his possession, and if, instead of risking all by a brilliant *coup-de-main*, he had there patiently awaited the result of that moral, or, to speak correctly, *im*moral power within the Parliament of England, which, though feeble, was boldly and loudly protesting against the injustice of Europe interfering with the French people in re-appointing as their ruler the Demon of War:—no doubt, if Bonaparte had taken such a course as this, a different result would have ensued. It might have been a good one,—it might have been a bad one; most certain it is, however, that *no* plan could possibly have ended more fatally for Napoleon's ambition than the one he voluntarily adopted.

On the other hand, if the Duke of Wellington, instead of scientifically deploying his forces into an army of observation, had concentrated the British, Hanoverian, Belgian, Dutch, and Prussian troops into one Babel phalanx, such a plan would undoubtedly have produced a different result, which might have been a good one, or which might have been a bad one; most certain however it is that *no* plan could have more promptly annihilated Napoleon's power, and have founded on its ruins a more lasting peace, than the cool, cautious, but vigorous course of operations which, under the direction of Divine Providence, the English General pursued.

The Duke of Wellington had two distinct and opposite duties to perform: first, defensively to occupy a long line, guarding his communications with England as well as with cities, roads, and fortresses of great military importance; secondly, to be ready rapidly to concentrate this army of occupation upon whatever point of his line Napoleon might think proper to attack. It is evident therefore, from the mere showing of the case, that until the Duke knew when and at what point of his line Napoleon's *real* attack was to be made, it was as impossible for him to prepare by concentration to resist it, as it would be impossible for a mathematician to draw for his Sovereign the circumference of a circle until his Majesty should have determined and made known to him where was to be the central point.

"On the 10th," says Mr. Alison, "the Duke of Wellington received intelligence, WHICH PROVED TO BE PREMATURE, that the Emperor had arrived in Maubeuge on the preceding day;

but, notwithstanding the proximity of such a man, at the head of such a force, *no steps were taken to concentrate the English and Prussian armies!*"—Vol. x., p. 922.

Why, only two pages before the above observation was written, Mr. Alison had himself narrated that Napoleon did not leave Paris to join his army until the morning of the 12th (no wonder therefore that the intelligence of his being at Maubeuge on the 10th "proved to be premature"); and yet, with this truth before his eyes, Mr. Alison actually censures the English General for not having, on the receipt of this hoax, concentrated the Allied army on the *reported* point of attack; in which case Napoleon, "leaving him alone in his glory," would of course have given him the go-by,—would have marched upon Brussels or some other important point, and would thus indeed have "out-generaled and out-manœuvred" his English and Prussian antagonists.

The Duke of Wellington, however, with cooler judgment, determined to keep his troops in their position until he distinctly knew on what part of his line it would be expedient for them to concentrate. The very instant this fact was communicated to him, on the afternoon of the 15th, with all possible rapidity he despatched his orders to the extremities of his line; and every other preparation for battle having long ago been arranged, he dressed himself and went to the Duchess of Richmond's ball; thereby demonstrating placidity of mind, self-reliance, and self-control, the harbingers of the victory he achieved.

As it therefore appears, not only from theoretical rea-

soning, but from stern practical results, that *no* plan of operations could have proved more fatal to Napoleon than the hurried arrangements he adopted; and that on the other hand, *no* course of conduct could possibly have produced more political and moral blessings than that which the Duke of Wellington cautiously pursued, it must be evident to future ages that Mr. Alison, in his ably-written 'History of the French Revolution,' has unintentionally erred in his opinion that, in the crisis alluded to, Napoleon "*out-manœuvred and out-generaled the Duke of Wellington and Blücher.*"

It is to be hoped that Mr. Alison will deem it due to his own high character, to correct the serious error into which he has fallen, and that, in the words of Lord Bacon, we shall hear him exclaim, in vindication of the British and Prussian Generals whose reputation he has assailed, "*You shall now see how easily and clean I will wash away the ink I have dashed in their faces.*"

F. B. H.

Athenæum, May 2, 1843.

THE LONDON AND NORTH-WESTERN RAILWAY.

A good many years ago one of the toughest and hardest riders that ever crossed Leicestershire undertook to perform a feat which, just for the moment, attracted the general attention not only of this country but of the sporting world. His bet was, that if he might choose his own turf, and if he might select as many thoroughbred horses as he liked, he would undertake to ride two hundred miles in ten hours!!!

The newspapers of the day described exactly how "the Squire" was dressed—what he had been living on—how he looked—how, at the word "*Away!*" he started like an arrow from a bow—how gallantly Tranby, his favourite racer, stretched himself in his gallop—how on arriving at his second horse he vaulted from one saddle to another—how he then flew over the surface of the earth, if possible faster than before—and how, to the astonishment and amidst the acclamations of thousands of spectators, he at last came in—— A WINNER!

Now if at this moment of his victory, while with

dust and perspiration on his brow,—his exhausted arms dangling just above the panting flanks of his horse, which his friends at each side of the bridle were slowly leading in triumph,—a decrepit old woman had hobbled forward, and in the name of Science had told the assembled multitude that, before she became a skeleton, she and her husband would undertake, instead of two hundred in ten hours, to go five hundred;—that is to say, that, for every mile "the Squire" had just ridden, she and her old man would go two miles and a half—that *she* would knit all the way—that *he* should take his medicine every hour and read to her just as if they were at home; lastly, that they would undertake to perform their feat either in darkness or in daylight, in sunshine or in storm, "in thunder, lightning, or in rain;"—who, we ask, would have listened to the poor maniac?—and yet, how wonderfully would her prediction have been now fulfilled! Nay, waggons of coals and heavy luggage nowadays fly across Leicestershire faster and farther than Mr. Osbaldestone could ever go, notwithstanding his condition and that of all his horses.

When railways were first established, every living being gazed at a passing train with astonishment and fear: ploughmen held their breath; the loose horse galloped from it, and then, suddenly stopping, turned round, stared at it, and at last snorted aloud. But the "nine days' wonder" soon came to an end. As the train now flies through our verdant fields, the cattle grazing on each side do not even raise their heads to look at it; the timid sheep fears it no more than the

wind: indeed the hen-partridge, running with her brood along the embankment of a deep cutting, does not now even crouch as it passes close by her. It is the same with mankind. On entering a railway station we merely mutter to a clerk in a box where we want to go,—say *"How much?"*—see him horizontally poke a card into a little machine that pinches it—receive our ticket—take our place—read our newspaper,—and on reaching our terminus drive away perfectly careless of all or of any one of the innumerable arrangements necessary for the astonishing luxury we have enjoyed.

On the practical working of a railway there is no book extant, nor any means open to the public of obtaining correct information on the subject.

Unwilling therefore to remain in this state of ignorance respecting the details of the greatest blessing which Science has ever imparted to mankind, we determined to make a short inspection of the practical machinery of one of our largest railways; and having on application to the Secretary, as also to the Secretary of the Post-Office, been favoured with the slight authorities we required, without companion or attendant we effected our object; and although under such circumstances our unbiassed observations were necessarily superficial, we propose by a few rough sketches rapidly to pass in review before our readers some of the scenes illustrative of the practical working of a railway, which we witnessed at the principal stations of the London and North-Western Railway;—say EUSTON, CAMDEN, WOLVERTON, and CREWE.

THE DOWN TRAIN.

On arriving in a cab at the Euston Station, the old-fashioned traveller is at first disposed to be exceedingly pleased at the new-born civility with which, the instant the vehicle stops, a porter opening its door with surprising alacrity, most obligingly takes out every article of his luggage. So soon however as he suddenly finds out that the officious, green, strait-buttoned-up official's object has been solely to get the cab off the premises, in order to allow the string of variegated carriages, that are slowly following, to advance;—in short, that, while he has been paying to the driver, say two shining shillings, his favourite great-coat—his umbrella, portmanteau, carpet-bag, Russia leather writing-case, secured by Chubb's patent lock, have all vanished,—he poignantly feels, like poor Johnson, that his "patron has encumbered him with help;" and it having been the golden maxim of his life never to lose sight of his luggage, it gravels and dyspepsias him beyond description to be civilly told that on no account can he be allowed to follow it, but that "*he will find it on the platform;*" and truly enough the prophecy is fulfilled; for there he does find it on a barrow in charge of the very harlequin who whipped it away, and who, as its guardian angel, hastily muttering the words "*Now then, Sir!*" stands beckoning him to advance.

The picture of the departure of one of the large trains from the Station at Euston Square, however often it may

have been witnessed, is worthy of a few moments' contemplation.

On that great covered platform, which, with others adjoining it, is lighted from above by 8797 square yards (upwards of an acre and three-quarters) of plate-glass, are to be seen congregated and moving to and fro in all directions, in a sort of Babel confusion, people of all countries, of all religions, of all languages, of high character, of low character, of no character at all;—infants just beginning life—old people just ending it,—many desirous to be noticed—many, from innumerable reasons, good, bad, and indifferent, anxious to escape notice; some are looking for their friends,—some, suddenly turning upon their heels, are evidently avoiding their acquaintance.

Contrasted with that variety of free and easy well-worn costumes in which quiet-minded people usually travel, are occasionally to be seen a young couple—each, like a new-born baby, dressed from head to foot in everything perfectly new—hurrying towards a *coupé*, on whose door there negligently hangs a black board—upon which there is printed, not unappropriately, in white bridal letters, the word "ENGAGED."

Across this mass of human beings a number of porters are to be seen carrying and tortuously wheeling, in various directions, baggage and property of all shapes and sizes. One is carrying over his right shoulder a matted parcel, twelve or fifteen feet long, of young trees, which the owner, who has just purchased them for his garden, is following with almost parental solicitude. Another

porter, leaning as well as walking backwards, is attempting with his whole strength to drag towards the luggage-van a leash of pointer-dogs, whose tails, like certain other "tails" that we know of, are obstinately radiating from the couples that bind together their heads; while a number of newspaper-vendors, "fleet-footed Mercuries," are worming their way through the crowd.

Within the long and apparently endless straight line of railway-carriages which bound the platform, are soon seen the faces and caps of various travellers, especially old ones, who with due precaution have taken possession of their seats; and while most of these, each of them with a newspaper unfolded on their knees, are slowly wiping their spectacles, several of the younger inmates are either talking to other idlers leaning on their carriage-windows, or, half kissing and half waving their hands, are bidding "farewell" to the kind friends who had accompanied them to the Station.

At the crisis just mentioned, we happened to be ensconced in the far corner of a railway-carriage, when we heard a well-known clergyman from Brighton suddenly observe to his next neighbour who sat between us, "*There must surely be something very remarkable in that scene!*" His friend, who was busily cutting open his 'Record,' made no reply; but, as we chanced to witness the trifling occurrence alluded to, we will very briefly describe it. A young man of about twenty-two, of very ordinary height, dress, and appearance, was standing opposite to a first-class carriage just as the driver's whistle shrilly announced the immediate departure of the train. At this

signal, without any theatrical movement, or affectation of any sort, he quietly reeled backwards upon a baggage-truck which happened to be immediately behind him. Two elderly ladies beside him instantly set to work, first of all, most vigorously to rub with their lean fingers the palms of his hands (they might just as well have scrubbed the soles of his boots)—they then untied his neckcloth; but their affectionate kindness was of no avail. The train was separating him from something, or from some one. Its movement however he had not witnessed, for the mere whistle of the engine had caused him to swoon! What corresponding effect, of fainting or sobbing, it may have produced on any inmate in that carriage before which he had long been standing, and which had just glided from him, we have no power to divine. It is impossible, however, to help reflecting what emotions must every day be excited within the train, as well as on the platform at Euston Station, by the scream or parting whistle which we have just described: from the murderer flying from the terrors of justice, down to the poor brokenhearted creditor absconding from his misfortunes;—from our careworn Prime Minister down to the most indolent member of either House of Parliament—each simultaneously escaping after a long-protracted session;—from people of all classes going from or to laborious occupation, down to the schoolboy reluctantly returning to, or joyfully leaving, his school;—from our Governor-General proceeding to embark for India, down to the poor emigrant about to sail from the same port to Australia,—the railway-whistle, however

unheeded by the multitude, must oftentimes have excited a variety of feelings which it would be utterly impossible to describe.

While the travellers of a train are peacefully taking their seats, artillery-men, horses, and cannon, on a contiguous set of rails, are occasionally as quietly embarking, in carriages, horse-boxes, and trucks, which are subsequently hooked on to a mass of passengers perfectly unconscious of the elements of war which are accompanying them.

As a departing railway-train, like a vessel sailing out of harbour, proceeds on its course, its rate rapidly increases, until, in a very short time, it has attained its full speed, and men of business are then intently reading the "City news," and men of pleasure the leading article of their respective newspapers, when this runaway street of passengers—men, women, and children—unexpectedly find themselves in sudden darkness, visible only by a feeble and hitherto unappreciated lamp, which, like the pale moon after a fiery sunset, modestly shines over their heads. By this time the boarded platform at Euston Station, but a few minutes ago so densely thronged, is completely deserted. The lonely guard on duty, every footstep resounding as he walks, paces along it like a sentinel. The newspaper-vendors, sick unto death of the news they had been vaunting, are indolently reclining at their stalls; even the boy who sells 'Punch' is half asleep; and there is nothing to break the sober dulness of the scene but a few clerks and messengers, who, like rabbits popping from one hole of their warren into an-

other, enter upon the platform from the door of one office to hurry into that of the next. In a few minutes, however, the loud puffing of an engine announces the approach towards the platform of a string of empty carriages, which are scarcely formed into the next departure-train, when vehicles of all descriptions are again to be seen in our most public thoroughfares, concentrating upon the focus of Euston Square; and thus, with a certain alleviation on Sundays, this strange, feverish admixture of confusion and quietness, of society and solitude, continues intermittently from a quarter-past six A.M. to ten P.M. during every day in the week, every week in the month, and every month in the year.

THE UP TRAIN.

The out-train having been despatched, we must now beg our readers to be so good as to walk, or rather to scramble, with us from the scene of its departure across five sets of rails, on which are lying, like vessels at anchor in a harbour, crowds of railway-carriages preparing to depart, to the opposite platform, in order to witness the arrival of an *in*coming train. This platform, for reasons which will shortly appear, is infinitely longer than that for the departure-trains. It is a curve nine hundred feet in length, lighted by day from above through plate-glass, and at night by sixty-seven large gas-lamps suspended from above, or affixed to the iron pillars that support the metallic networked roof. Upon this extensive platform scarcely a human being is now to be seen; never-

theless along its whole length it is bounded on the off-side by an interminable line of cabs, intermixed with private carriages of all shapes,—gigs, dog-carts, and omnibuses, the latter standing opposite to little ugly, black-faced, projecting boards, which by night as well as by day are always monotonously exclaiming, "*Holborn!—Fleet Street and Cheapside!—Oxford Street!—Regent Street!—Charing Cross!*" etc.

In this motley line, smart coachmen, tall, pale, powdered footmen, and splendid horses are strangely contrasted with the humble but infinitely faster conveyance—the common cab. Most of the drivers of these useful machines, strange to say, are absent; the remainder are either lolling on benches, or, in various attitudes, dozing on their boxes. Their horses, which are generally well-bred, and whose bent knees and fired hocks proclaim the good services they have performed, stand ruminating with a piece of sacking across their loins, or with nose-bags,—often empty,—until for some reason a carriage before them leaves their line; in which case, notwithstanding the absence of their drivers and regardless of all noises, they quietly advance along the edge of the little precipice which bounds the rails. They know quite well what they are waiting for, and have no desire to move. Indeed it is a Pickwickian fact, well known to cab-drivers, that their horses travel unwillingly *from* the Station, but always pull hard coming back, simply because it is during the waiting-time at Euston Station that their nose-bags are put on, or, in other words, that they are fed.

We may here observe that there are sixty-five selected

cabmen who have the *entrée* to the platform, and who, *quamdiu se bene gesserint,* are allowed exclusively to work for the Company, whose name is painted on their cabs. If more than these are required, a porter calls them from a line of supplicant cabs standing in the adjacent street. Close to each departure-gate there is stationed a person whose duty it is to write down in a book the number of each cabman carrying away a passenger, as well as the place to which he is conveying him, which each driver is required to exclaim as he trots by; and thus any traveller desirous to complain of a cabman, or who may have left any property in a carriage from Euston Station, has only to state on what day and by what train he arrived, also whither he was conveyed, and from these data the driver's name can at any lapse of time be readily ascertained.

But our attention is suddenly claimed by something of infinitely more importance than a passenger's luggage; for that low, unearthly whine within the small signal-office behind the line of cabs and carriages, requires immediate explanation.

The variety of unforeseen accidents that might occur by the unwelcome arrival of an unexpected, or even of an expected, passenger-train at the great terminus of the London and North-Western Railway are so obvious that it has been deemed necessary to take the following precautions.

As soon as the reeking engine-funnel of an up train is seen darting out of the tunnel at Primrose Hill, one of the Company's servants stationed there, who deals solely

in compressed air,—or rather, who has an hydraulic machine for condensing it—allows a portion to rush through an inch iron pipe; and he thus instantaneously produces in the little signal-office on the up platform of Euston Station, where there is always a signal-man watching by night as well as by day, that loud melancholy whine which has just arrested our attention, and which will continue to moan uninterruptedly for five minutes:—

"Hîc vasto rex Æolus antro
Luctantes ventos tempestatesque sonoras
Imperio premit, ac vinclis et carcere frænat.
Illi indignantes magno cum murmure fremunt."

The moment this doleful intimation arrives, the signal-man, emerging from his little office, touches the trigger of a bell outside his door, which immediately, in two loud, hurried notes, announces to all whom it may concern the arrival at Camden Station of the expected up train; and at this moment it is interesting to watch the poor cab-horses, who, by various small muscular movements, which any one acquainted with horses can readily interpret, clearly indicate that they are perfectly sensible of what has just occurred, and quite as clearly foresee what will very shortly happen to them.

As soon as the green signal-man has created his sensation among bipeds and quadrupeds, taking with him the three flags, of danger (red), caution (green), and security (white), he proceeds down the line a few yards, to a point from which he can plainly see his brother signal-man stationed at the mouth of the Euston tunnel. If any obstruction exists in that direction, the waving of

the red flag informs him of it; and it is not until the white one from the tunnel, as well as that from the station-master on the platform, have reported to him that "all is clear," that he returns to his important but humble office (twelve feet in length, by nine in breadth) to announce, by means of his compressed-air apparatus, this intelligence to the ticket-collector at Camden Station, whose strict orders are, on no account whatever to allow a train to leave his platform until he has received through the air-pipes, from the Signal-office at Euston Station, the Company's lugubrious authority to do so.

In the latter office are also the dial and wires of an electric telegraph, the practical utility of which the signal-man illustrated to us by the following trifling circumstance:—An old General Officer, who had just come up to Euston Station from his residence some miles beyond Manchester, on an invitation from the East-India Directors to be present at the dinner to be given by them to Lord Hardinge, found on his arrival that it would be necessary he should appear in regimentals: and the veteran, nothing daunted, was proposing to return to Manchester, when the signal-man at Euston advised him to apply for them by electric telegraph. He did so. The application, at the ordinary rate of 280,000 miles (about twelve times the circumference of the earth) *per second*, flew to Manchester; in obedience to its commands, a porter was instantly despatched into the country for the clothes, which, being forwarded by the express train, arrived in abundant time for the dinner. The charge for telegraph and porter was 13*s*. 8*d*.

About four minutes after the up-train has been authorized by the air-pipe to leave Camden Station, the guard at the Euston tunnel, who stands listening for it, just as a deaf man puts his ear to a trumpet, announces by his flag its immediate approach; on which the signal-man at the little office on Euston platform again touches his trigger, which violently convulsing his bell as before, the cab-horses begin to move their feet, raise their jaded heads, prick up their ears, and champ their bits; the servants in livery turn their powdered heads round; the Company's porters, emerging from various points, quickly advance to their respective stations; and this suspense continues until in a second or two there is seen darting out of the tunnel, like a serpent from its hole, the long, dark-coloured, dusky train, which, by a tortuous movement, is apparently advancing at its full speed. But the bank-riders, by applying their breaks,—without which the engineless train, merely by its own gravity, would have descended the incline from Camden Station at the rate of forty miles an hour—soon slacken its speed, until the Company's porters are enabled at a brisk walk to unfasten one after another the doors of all the carriages.

While they are performing this popular duty, numerous salutations, and kissings of hands of all colours and sizes, are seen to pass between several of the inmates of the passing train and those seated in or on the motley line of conveyances standing stock still, which have been awaiting their arrival. A wife suddenly recognizes her husband; a mother her four children; a sister her two dear brothers; Lord A. B. politely bows to Lady C. D.;

John, from his remote coach-box, grins with honest joy as faithful Susan glides by; while Sally bashfully smiles at "a gentleman" in plush breeches reclining in the rumble of the barouche behind it.

As soon as the train stops, a general *sauve qui peut* movement takes place, and our readers have now an opportunity of observing that, just as it is hard to *make* money, easy to spend it, so, although it requires at least twenty minutes to fill and despatch a long train, it scarcely requires as many seconds to empty one. Indeed, in less than that short space of time the greater number of the railway-carriages are often empty!

When every person has succeeded in liberating himself or herself from the train, it is amusing to observe how cleverly, from long practice, the Company's porters understand the apparent confusion which exists. To people wishing to embrace their friends,—to gentlemen and servants darting in various directions straight across the platform to secure a cab, or in search of private carriages,—they offer no assistance whatever, well knowing that none is required. But to every passenger whom they perceive to be either restlessly moving backwards and forwards, or standing still, looking upwards in despair, they civilly say *"This way, Sir!" "Here it is, Ma'am!"*—and thus, knowing what they want before they ask, they conduct them either to the particular carriage on whose roof their baggage has been placed, or to the luggage-van in front of the train, from which it has already been unloaded on to the platform; and thus, in a very few minutes after the convulsive shaking of hands, and the

feverish distribution of baggage have subsided, all the cabs and carriages have radiated away;—the party-coloured omnibuses have followed them;—even the horses, which in different clothing have been disembarked, have been led or ridden away;—and, the foot-passengers having also disappeared, the long platform of the incoming train of the Euston Station remains once more solely occupied by one or two servants of the Company, hemmed in by a fresh line of expectant cabs and omnibuses. Indeed, at various periods of the day a very few minutes only elapse before, at the instigation of compressed air, the faithful signal-bell is again heard hysterically announcing the arrival of another train at Camden Station.

In a clear winter's night the arrival of an up train at the platform before us forms a very interesting picture.

No sound is heard in the cold air but the hissing of a pilot-engine, which, like a restless spirit advancing and retrograding, is stealing along the intermediate rails, waiting to carry off the next down-train; its course being marked by white steam meandering above it, and by red-hot coals of different sizes continually falling from beneath it. In this obscure scene the Company's interminable lines of gaslights (there are 232 at the Euston Station), economically screwed down to the minimum of existence, are feebly illuminating the damp, varnished panels of the line of carriages in waiting, the brass door-handles of the cabs, the shining haims, brass browbands, and other ornaments on the drooping heads and motionless backs of the cab-horses; and while the blood-red signal-lamp

is glaring near the tunnel, to deter unauthorized intrusion, the stars of heaven cast a faint silvery light through the long strips of plate-glass in the roof above the platform. On a sudden is heard—the stranger hardly knows whence—the mysterious moan of compressed air, followed by the violent ringing of a bell. That instant every gas-light, on and above a curve of 900 feet, suddenly bursts into full power. The carriages, cabs, etc., appear, comparatively speaking, in broad daylight, and the beautiful iron reticulation which sustains the glazed roof appears like fairy work.

THE RAILWAY CARRIAGES.

We will now proceed to detail a few circumstances respecting the railway-carriages, about which our readers have probably never cared to inquire.—And, *firstly*, as soon as an up train arrives at the commencement of the Euston platform, while it is still in motion, and before its guard—distinguished by a silver-buckled, black, shiny, patent-leather belt, hanging diagonally across the white buttons of his green uniform-coat—has ventured with practised skill to spring from the sideboard of the train to the platform, two greasy-faced men in canvas jackets, with an oil-can in each of their right hands, and with something like a mop-head of dirty cotton hugged under each of their left arms, are to be seen running on each side of the rails below, in pursuit of the train; and while the porters, holding the handles of the carriage-doors, to prevent any traveller from escaping, are still advancing

at a brisk walk, these two oilmen, who have now overtaken the train, diligently wipe, as they proceed, the dust and perspiration from the buffer-rods of the last carriage. As soon as these irons are perfectly clean and rubbed dry, they oil them from their can; and then—crawling beneath the open doors of the carriages and beneath the feet and ankles of a crowd of exuding travellers of all ages, who care no more for oilmen than the oilmen of this world care for them—they hurry to the buffer-rods of the next carriage; and so rapidly do they proceed, that before the last omnibus has driven off, the buffer-rods of the whole train are as bright as when new. But, *secondly*, these two men have been closely followed by two others in green jackets—one on each side of the carriage—who deal solely in a yellow composition of tallow and palm-oil. Carrying a wooden box full of this ointment in one hand and a sort of short flat salve-knife in the other, they open with the latter the small iron trap-doors which cover the receptacles for greasing the axles, restore whatever quantity has been exhausted, and then, closing with a dexterous snap the little unctuous chamber over which they preside, they proceed to the next tallow-box; and thus, while the buffer-rods of the whole train are being comfortably cleaned and greased, the glistening axles of the carriages are simultaneously fed with luxurious fat. *Thirdly*, while these two operations are proceeding in the lower region, at about the same rate two others are progressing, one inside the carriages and the other on their roofs; for on the arrival of every passenger-train, the carriage

"*searcher*," also "beginning at the end," enters every carriage, lifts up first all the stuffed, blue seats, next the carpet, which he drops in a heap in the middle of the carriage, and then, inquisitively peeping under the two seats, he leaves the carriage, laden with whatever article or articles may have been left in it, to continue his search throughout the train. The inconceivable number and variety of the articles which he collects we shall shortly have occasion to notice. *Fourthly*, above the searcher's head, on the roof, and following him very closely in his course, there "sits up aloft" a man called a "*strapper*," whose sole duty it is, on the arrival of every train, to inspect, clean, shampoo, and refresh with cold-drawn neat's-foot oil the luggage straps, which, in consequence of several serious accidents that have occurred from their breaking, are now lined inside with strong iron wire. It is the especial duty of this inquisitor to condemn any straps that may be faulty, in order that they may be immediately replaced.

As soon as these four simultaneous operations are concluded, directions are given by the station-master to remove the up carriages from their position, that the rails may be clear for the arrival of the next train. At this word of command a pilot-engine, darting from its lurking-place like a spider from its hole, occasionally hisses up to the rear of the train, and drags it off bodily into a siding. The usual mode, however, of getting an in-train out of the way is by the assistance of various unnoticed turn-tables, upon which portions of it are standing. By these simple contrivances the carriages,

after being unhooked from each other, are rapidly carried off into the sidings, where they are arranged, according as they may afterwards be required, among the five sets of rails which lie between the opposite platforms of the arrival and departure trains. No sooner, however, do they reach this haven, than a large gang of strong he-housemaids, clattering towards them in wooden shoes and in leather leggings rising above their bony knees, are seen advancing, some with mops in their hands, others with large chamois-leathers, while others are carrying on their shoulders a yoke, from which are suspended *in equilibrio* two pails. From pipes on each side of these five sets of rails, water is immediately drawn off, and the busy operation of washing then begins. Half-a-dozen dusty, dirty-faced, or rather dirty-bodied, carriages are simultaneously assailed on each of their sides by wet mops flying up, down, and around in all directions. The wielders of these, be it noticed, are so skilful in their vocation, that while they are talking to their "pailers" they with great velocity continue to mop round the woodwork of the various-shaped plate-glass windows, just as vigorously and as accurately as if they were looking at them; indeed, it is evident that they know the position of railway-carriage doors, windows of all forms, handles, steps, etc., so accurately, that they could mop a coach clean in the dark;—and probably they often go through these motions when they are asleep, just as King Richard III. in his dream called for his horse and for linen bandages,—just as the sleeping orator ejaculates portions of his prepared speech,—and just as an

equally tired, out-stretched fox-hound, during the night occasionally convulsively kicks with his uppermost hind-leg, and yelps aloud when he thinks of the view he got of Reynard as he first gallantly broke away from Waterloo gorse. It may possibly not be known to some of the most fashionable of our readers that among "moppers" there exist the same gradations which so distinctly separate them from "the lower classes" of society. A "first-class *mopper*" would on no account demean himself by mopping a second-class carriage, and in like manner a "second-class mopper" only attains that distinction after he has for a sufficient length of time been commissioned to mop horse-boxes and common luggage-trains.

After the passenger-carriages are all washed and dried, they are minutely examined by one or more of the foremen of the coach-department, who order off to their adjoining establishment any that may require repair. Those that remain are then visited, lastly, by "*the duster*," who enters each carriage with a cloth, a leather, a brush, and a dust-pan, with which apparatus he cleans the windows, wipes the woodwork, brushes the blue cloth seats, sides, and backs—and when this operation is concluded the carriages are reported fit to depart, and accordingly are then marshalled into trains for that purpose.

LOST LUGGAGE OFFICE.

At a short distance from the terminus of the up trains there is a foundling-office, termed the Lost Luggage

Office, in which are received all articles which the passengers leave behind them, and which on the arrival of every train are accordingly brought by the Company's "searcher" to this office. On receiving them, the Superintendent records in a book a description of each article, also on what day, by what train, in what carriage it arrived; and by whom found. All luggage bearing an address is kept about forty-eight hours, and if during that time no one calls for it, it is then forwarded by rail or other conveyance to its owner. In case it bears *no* address, if not inquired after, it is, after a month, opened; and if any clue to the owner can be found within, a letter is addressed to him. If no clue be found, the property is kept about two years, and has hitherto been then sold by auction, in the large coach-factory, to the Company's servants—a portion of the proceeds being handed over to the sick-fund, for persons who have been hurt in the service, and the remainder to the "Friendly Society" among the men. It having, however, been ascertained that a few of the railway-men who had spare cash purchased the greater portion of these articles, it has very lately been determined henceforward to sell the whole of this property by auction *exclusively to the public;* and as the Company's servants are not allowed to be purchasers, they can no longer derive any benefit whatever from lost property, often of inestimable value to its owner, and which they therefore should have no interest, direct or indirect, in concealing from him.

A second ledger, entitled *"Luggage Inquiry Book,"* is kept in this office, and, if the articles therein inquired

after have not been brought in by the searcher, copies of the description are forwarded to each of the offices where lost luggage is kept.

As a last effort, the Superintendent of the Lost Luggage Office at Euston Station writes to 310 stations on forty-two lines of rails, to inquire after a lost article, however small; and if it be at none of these stations, a letter is then addressed to the owner, informing him that his lost property *is not on the railway.*

In the office in which these ledgers and letter-books are made up are to be seen, on shelves and in compartments, the innumerable articles that have been left in the trains during the last two months, each being ticketed and numbered with a figure corresponding with the entry-book in which the article is defined. Without, however, describing in detail this property, we must beg our readers to descend with us to a large, pitch-dark, subterranean, vaulted chamber, warmed by hot-air iron pipes, in which are deposited the flock of lost sheep, or, without metaphor, the lost luggage of the last two years.

Suspended from the roof there hangs horizontally in this chamber a gas-pipe about eight feet along, and as soon as the brilliant burners at each end are lighted, the scene is really astounding. Indeed, it would be infinitely easier to say what there is not, than what there is, in the forty compartments, like great wine-bins, in which all this lost property is arranged. One is chokefull of men's hats; another, of parasols, umbrellas, and sticks of every possible description. One would think that all the ladies' reticules on earth were deposited in a

third. How many little smelling-bottles—how many little embroidered pocket-handkerchiefs—how many little musty eatables and comfortable drinkables—how many little bills, important little notes, and other very small secrets each may contain, we would not for the world ascertain; yet, when we gaze at the enormous quantity of red cloaks, red shawls, red tartan-plaids, and red scarfs piled up in one corner, it is impossible to help reflecting that surely English ladies of all ages who wear red cloaks, etc., must in some mysterious way or other be powerfully affected by the whine of compressed air, by the sudden ringing of a bell, by the sight of their friends—in short, by the various conflicting emotions that disturb the human heart on arriving at the up-terminus of the Euston Station; for else how, we gravely ask our readers, can we possibly account for the extraordinary red heap before us?

Of course, in this Rolando-looking cave appear plenty of carpet-bags, gun-cases, portmanteaus, writing-desks, books, Bibles, cigar-cases, etc.; but there are a few articles that certainly we were not prepared to meet with, and which but too clearly prove that the extraordinary terminus-excitement which had suddenly caused so many virtuous ladies to elope from their red shawls—in short, to be on a sudden not only in "a bustle" behind, but all over—had equally affected *men* of all sorts and conditions.

One gentleman has left behind him a pair of leather hunting-breeches! Another, his boot-jack! A soldier of the 22nd Regiment his knapsack containing his kit! Another soldier of the 10th, poor fellow, his scarlet regimental coat! Some cripple, probably overjoyed at the

sight of his family, his crutches!! But what astonishes us above all is that some honest Scotchman, probably in the ecstasy of suddenly seeing among the crowd the face of his faithful *Jeanie*, has actually left behind him the best portion of his bagpipes!!!

Some little time ago the Superintendent, on breaking open, previous to a general sale, a locked leather hat-box, which had lain in this dungeon two years, found in it, under the hat, £65 in Bank of England notes, with one or two private letters, which enabled him to restore the money to the owner, who, it turned out, had been so positive that he had left his hat-box at an hotel at Birmingham that he had made no inquiry for it at the railway-office.

PARCEL-DELIVERY OFFICE.

Besides what is termed the "goods traffic," or the conveyance of heavy goods in luggage-trains, the London and North-Western Railway Company have, for some time, undertaken to forward by their passenger-trains, to the various stations on as well as beyond their lines, light parcels, for the conveyance and delivery of which, charges, of which the following are a sample, are made:—

For parcels under 12 lbs. weight:—	s.	d.
From London to any part of Birmingham, and *vice versâ*	1	0
For distances under 160 miles	1	6
„ „ 210 miles	2	0
From London to Durham, Carlisle, or Newcastle	3	0
From London to Edinburgh or Glasgow	4	0

The above charges include porterage and delivery of the parcels. In London, however, the delivery is limited to within three miles of the General Post-office, or say six miles from Euston-square.

The mode in which the business of this department is conducted at Euston Station is briefly as follows:—

The superintendent of the department sits in an elevated room, the sides of which, being glazed, enable him to look down on his right and left into two offices, both communicating on the south with the street, by which parcels arrive from or depart to various parts of the Metropolis, and on the north side with a branch railway leading into the main line. The floor of one of these two offices is generally covered with articles that have just arrived by rail from all parts of England, Ireland, and Scotland; that of the other, with parcels to be despatched by rail to similar destinations. In the daytime the down parcels are despatched from the office in the break-waggons of various passenger-trains, and the following locked-up vans laden with small parcels are also forwarded every night:—

2	vans for	Birmingham.	1	van for	Newcastle.
1	„	Manchester.	1	„	Derby.
1	„	Liverpool.	1	„	Nottingham.
1	„	Carlisle and Lancaster.			

The number thus conveyed to and from London and the North, during the year 1847, amounted to 787,969. The manner in which all these little parcels are circulated throughout the country is as follows:—

As soon as the empty railway-vans arrive by the branch

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rail close to the north side of the parcels-office, a porter, who, assisted by his comrades, has for some time previously been arranging the parcels into heaps according to their respective destinations, commencing with one set of them, and rapidly taking up parcel after parcel, exclaims in a loud monotonous tone easily (enough set to music, inasmuch as it is exactly the middle note of a stout porter's voice, and which, during the whole operation, never varies for a moment) :—

"Now *Leighton.*
"A paper for Hancock, of ——, light.
"A basket for Wagstaff, of ——, out 8*d.*, light.
"A box for Tomkins, of ——, weighs [he puts it into an index-scale at his right hand, and in about three seconds adds] twenty-six pounds.
"A paper for Jones, of ——, out 4*d.*
"Now *Leamington.*
"A paper for S. on Avon [the porter never says *Stratford*] for ——, light," etc. etc.

As fast as this chanting porter drawls out his facts the chief clerk records them, convulsively snatching up, at each change of station, the particular book of entry which belongs to it. Another clerk, at each exclamation, hands over to a porter a bill for the cost of conveyance, which he pastes to every parcel. For all articles declared by the first porter to be "*light*," by which he means that they do not exceed twelve pounds weight—(by far the greater number are of this description)—the charge on the paper to be affixed is ready printed, which effectually prevents fraud; but where the weight *exceeds* twelve

pounds, or where any sum has been paid out, the charges are unavoidably inserted in ink. The velocity with which all these little parcels are booked, weigh-billed, placed into hand-trucks, wheeled off to their respective vans, packed, locked up, and then despatched down the little branch rail to the main line, on which reposes the train ready to convey them, is very surprising. While witnessing the operation, however, we could not help observing that the Company's porters took about as much notice of the words "Keep this side uppermost," "With care," "Glass," "To be kept *very* dry," etc., as the Admiralty would to an intimation from some dowager-duchess that her nephew, about to join the 'Thunderer' as a midshipman, "has rather *a peculiar constitution*, and will therefore require for some years *very particular* CARE."

COACH DEPARTMENT.

The new carriages for the southern division of the London and North-Western Railway are principally built by contract, in the City, by Mr. Wright, who also supplies carriages for other English railways, as well as a great number for Germany. The Company's establishment at Euston Station, which is therefore principally for the maintenance of carriages of various descriptions, running between London and Birmingham, consists of a large area, termed "the Field," where, under a covering almost entirely of plate-glass, are no less than fourteen sets of rails, upon which wounded or spare carriages lie until doctored or required. Im-

mediately adjoining are various workshops, the largest of which is 260 feet in length, by 132 in breadth, roofed with plate-glass, lighted by gas, and warmed by hot air. In this edifice,—in which there is a strong smell of varnish, and in the corner of which we found men busily employed in grinding beautiful colours, while others were emblazoning arms on panels,—are to be seen carriages highly finished as well as in different stages of repair. Among the latter there stood a severely wounded second-class carriage. Both its sides were in ruins; its front so effectively smashed that not a vestige of it remained; the ironwork of the guard's step appeared bent completely upwards; and a tender behind was nearly filled with the confused *débris* of its splintered woodwork;—and yet, strange to say, a man, his wife, and their little child, who had been in this carriage during its accident, had providentially sustained no injury! Close to this immense warehouse we found a blacksmith's shop seventy-five feet square, lighted from the roof with plate-glass, containing in the centre a large chimney, around which were simultaneously at work fourteen forges, blown by a steam-engine of seventeen-horse power, which works machinery in two other shops. As, however, we shall have occasion to describe the Company's coaching establishment at Crewe, we will abruptly take leave of the details before us.

CAMDEN.—THE LOCOMOTIVE ENGINE.

Considering how many fine feelings and good feelings

adorn the interior of the human heart, it is curious to observe with what facility we can put them all to sleep; or, if *they* won't sleep, stupify ourselves, at any moment when it becomes inconvenient to us to listen to their friendly admonitions. All the while mailing, coaching, and posting, were in fashion, every man's countenance beamed—every person's tongue gabbled freely—as it described, not only "*the splendid rate*" (say ten miles an hour) at which he had travelled, but the celerity with which, no sooner had the words "*First turn out!*" been exclaimed by the scout (who vanished as soon as he uttered them), than four horses in shining harness had appeared, half hobbling, half trotting from under the archway of the Red Lion, the Crown, or the Three Bells, before which the traveller had from a canter been almost suddenly pulled up, to receive various bows, scrapes, and curtsies, from the landlord and his rosy-faced, cap-beribboned wife. But, although we could all accurately describe our own enjoyments, and, like Johnson, expatiate on "the delightful sensations" we experienced in what we called *fast* travelling, who among us ever cared to ascertain, or even for a single moment to think of, the various arrangements necessary for watering, feeding, cleaning, and shoulder-healing all the poor horses whose "brilliant" performances we had so much admired? Whether they slept on straw or on stones—indeed, whether they slept at all;—what was their diet;—what, if any, were their enjoyments;—what were their sufferings;—and, lastly, how and where they eventually died,—it would have been deemed ex-

ceedingly vulgar to inquire; and so, after with palpitating flanks and panting nostrils they had once been unhooked from our splinter-bars,

> "Where they went, and how they fared,
> No man knew, and no man cared!"

In a similar way we now chloroform all kindly feelings of inquiry respecting the treatment of the poor engine-drivers, firemen, and even of the engine that has safely conveyed us, through tunnels and through storms, at the rate of thirty, forty, and occasionally even fifty miles an hour—

> "Oh no! we never mention them!"

and, in fact, scarcely do we even deign to look at them. Indeed, even while in the train, and especially after we have left it, we should feel bored to death by being asked to reflect for a moment on any point or any person connected with it. We have therefore, we feel, to apologize, at least to some of our readers, for bringing "betwixt the wind and their nobility" the following uninteresting details.

As soon as an engine has safely dragged a passenger-train to the top of the incline at Camden Station, at which point the coupling-chains which connected it with its load are instantly unhooked, it is enabled by the switchman to get from the main line upon a pair of almost parallel side-rails, along which, while the tickets are being collected, it may be seen and heard retrograding and hissing past its train. After a difficult and intricate passage from one set of rails

to another, advancing or "shunting" backwards as occasion may require, it proceeds to the fire-pit, over which it stops. The fireman here opens the door of his furnace, which by a very curious process is made to void the red-hot contents of its stomach into the pit purposely constructed to receive them, where the fire is instantly extinguished by cold water ready laid on by the side. Before however dropping their fire, the drivers are directed occasionally to blow off their steam, to clean; and we may further add that once a week the boiler of every engine is washed out to get rid of sediment or scale, the operation being registered in a book kept in the office. After dropping his fire, the driver, carefully taking his fire-bars with him, conducts his engine into an immense shed or engine-stable, four hundred feet in length by ninety in breadth, generally half full of locomotives, where he examines it all over, reporting in a book what repairs are wanting, or, if none (which is not often the case), he reports it "*correct.*" He then takes his lamps to the lamp-house, to be cleaned and trimmed by workmen solely employed to do so; after which he fetches them away himself. Being now off duty, he and his satellite fireman go either to their homes, or to a sort of club-room, containing a fire to keep them warm, a series of cupboards to hold their clothes, and wooden benches on which they may sit, sleep, or ruminate until their services are again required; and here it is pleasing to see these fine fellows in various attitudes enjoying rest and stillness after the incessant noise, excitement, and occasional tempests of wind and

rain, to which—we will say nothing of greater dangers —they have been exposed.

The duties which the engine-driver has to perform are not only of vital importance, but of a nature which peculiarly illustrates the calm, unpretending, bull-dog courage, indigenous to the moist, healthy climate of the British Isles. Even in bright sunshine, to stand—like the figure-head of a ship—foremost on a train of enormous weight, which, with fearful momentum, is rushing forward faster than any racehorse can gallop, requires a cool head and a calm heart; but to proceed at this pace in dark or foggy weather into tunnels, along embankments, and through deep cuttings, where it is impossible to foresee any obstruction, is an amount of responsibility which scarcely any other situation in life can exceed: for not only is a driver severely punished for any negligence he himself may commit, but he is invariably sentenced personally to suffer on the spot for any accident that, from the negligence of others, may suddenly befall the road along which he travels, but over which he has not the smallest control. One of the greatest hardships he has to endure is from cold,—especially that produced in winter by evaporation from his drenched clothes passing rapidly through the air. Indeed, when a gale of wind and rain from the north-west, sweeping over the surface of the earth at its ordinary rate of, say sixty miles an hour, suddenly meets the driver of the London and North-Western, who has not only to withstand such an antagonist, but to dash through him, and in spite of him to proceed in an opposite direc-

tion at the rate of, say forty miles an hour,—the conflict between the wet Englishman and Æolus, tilting by each other at the combined speed of a hundred miles an hour, forms a tournament of extraordinary interest.

As the engine is proceeding, the driver, who has not very many inches of standing-room, remains upon its narrow platform, while his fireman, on about the same space, stands close beside him on the tender. We tried the position: the engine, however, was so hot, that we found it necessary to travel with one foot only on it, and the other on the tender; and as the motion of each was very different, we felt as if each leg were galloping at a different stride. Nevertheless, the Company's drivers and firemen usually travel from a hundred to a hundred and twenty miles per day, performing six of these trips per week; nay, a few run a hundred and sixty-six per day—for which they are paid eight days' wages for six trips.

But to return to the engine which we just left in the engine-house. As soon as the driver has carefully examined it, and has recorded in a book the report we have described, "the foreman of the fitters" comes to it, and examines it all over again; and if anything is found out of order which, on reference to the book, the driver has not recorded, the latter is reported by the former for his negligence. A third examination is made by Mr. Walker, the chief superintending engineer of the station. If HE detects any defect that has escaped the notice not only of the driver, but of the foreman of the fitters, woe betide them both!

While the engine, with several workmen screwing and hammering at it, is undergoing the necessary repairs, we will consider for a moment a subject to which Englishmen always attach considerable importance; namely, its victuals and drink, or, in other words, its coke and water. There is at Camden Station a coke-factory composed of eighteen ovens, nine on each side, in which coal after being burnt for about fifty hours gives nearly two-thirds of its quantity of coke. These ovens produce about twenty tons of coke per day; but, as fifty tons per day are required for the Camden Station alone, the remaining thirty tons are brought by rail all the way from Newcastle. Indeed, with the exception of fifty ovens at Peterborough, the whole of the coke required annually for the London and North-Western Railway, amounting to 112,500 tons of an average value of £1 per ton, comes from the northern coal-fields. For some time there arose continual quarrels between the coke suppliers and receivers; the former declaring that the Company's waggons had been despatched from the North as soon as loaded, and the latter complaining that they had been unnecessarily delayed. A robin redbreast settled the dispute; for, on unloading one of the waggons immediately on its arrival at Camden Station, her tiny nest, with three eggs in it, mutely explained that the waggon had *not* been despatched as soon as loaded.

In order to obtain an ample supply of water for their engines, the Company at considerable expense sank at Camden an Artesian well ten feet in diameter and 140

feet deep. The produce of this well, pumped by a high-pressure steam-engine of 27-horse power into two immense cisterns 110 feet above the rails at Euston Square, supplies all the Camden Station, all the Company's houses adjoining the whole of the Euston Station, as well as the Victoria and Euston Hotels, with most beautiful clear water; and yet—though every man who drinks it or who shaves with it admires it, and though every lady who makes tea with it certifies that it is particularly well adapted for that purpose—strange to say, it disagrees so dreadfully with the stomachs of the locomotive engines —(who would ever suspect theirs to be more delicate than our own?)—that the Company have been obliged, at great inconvenience and cost, to obtain water for them elsewhere. The boilers of the locomotives were not only incrusted with a deposition of the unusual quantity of soda contained in the Artesian-well water at Camden Station—but, often without even waiting for this inconvenience, the engine spit it out with the steam through the funnel-pipe, a well-known misfortune termed by engineers "*priming.*"

As much time would be required for each travelling engine to get up its steam *ab initio*, a coke-furnace has been constructed at Camden Station to hasten the operation. Here nine men during the day, and the same number throughout the night, are continually employed to heat coke, which by means of iron shovels is delivered red-hot into the engines' furnaces.

These preparations having been made, the drivers' duties are as follows:—

On leaving the shed in the morning, the engine, after having been heated at the coke-furnace, is conducted on to a great turn-table forty feet in diameter, which twists it towards a set of rails leading to the water-crane, where at one draught it imbibes about a thousand gallons of cold water, which, under ordinary circumstances, will enable it to draw its train about forty miles; although in slippery weather, when the wheels revolve *on*, instead of *along*, the rails, it of course would not carry it so far. It then proceeds to the coke-shed,—an enclosure 210 feet by 45 feet, capable of holding 1500 tons—for its proper supply of coke, namely one ton,—a goods-engine usually devouring 2½ tons.

The driver, leaving his engine in charge of his fireman, now proceeds to the office, where he signs his name in a book,—the real object being that it may be observed whether or not he is perfectly sober. From the chief clerk he receives his time-ticket, upon which, at every station, he has to record whatever time he may have lost up to that point; and when his chronometer is wound up, and set to the proper time, he is then considered to be ready for his journey.

The gigantic power of the locomotive engines hourly committed to the charge of these drivers was lately strangely exemplified in the large engine-stable at the Camden Station. A passenger-engine, whose furnace-fire had but shortly been lighted, was standing in this huge building with a number of artificers, who, in presence of the chief superintendent, were working in various directions around it. While they were all busily

occupied, the fire in the furnace, by burning up faster than was expected, suddenly imparted to the engine the breath of life: and no sooner had the minimum of steam necessary to move it been thus created, than this infant Hercules not only walked *off*, but without the smallest embarrassment walked *through* the fourteen-inch brick wall of the great building which contained it, to the terror of the superintendent and workmen, who expected every instant that the roof above their heads would fall in and extinguish them! In consequence of the spindle of the regulator having got out of its socket, the very same accident occurred shortly afterwards with another engine, which, in like manner, walked through another portion of this fourteen-inch wall of the stable that contained it, just as a thorough-bred horse would have walked out of the door. And if such be the irresistible power of the locomotive engine when feebly walking in its new-born state, unattended even by its tender, is it not appalling to reflect what must be its momentum when, in the full vigour of its life, it is flying down a steep gradient at the rate of fifty miles an hour, backed up by say thirty passenger-carriages, each weighing on an average 5½ tons? If ordinary houses could suddenly be placed on its path, it would, passengers and all, run through them as a musket-ball goes through a keg of butter; but what would be the result if, at this full speed, the engine by any accident were to be diverted against a mass of solid rock, such as sometimes is to be seen at the entrance of a tunnel, it is almost impossible to calculate, or even to conjecture. It

was stated to us by the Company's Superintendent, who witnessed the occurrence, that some time ago, an ordinary accident happening to a luggage-train near Loughborough, the waggons overrode each other, until the uppermost one was found piled forty feet above the rails!

At Camden Station there are every day five spare or pilot engines, with their steam up, ready for assisting a train up the incline, or for any special purpose that may be required!

The average cost of the locomotive engines and tenders, which, for the rails between London and Birmingham, are usually purchased by the Company from makers at Manchester, Warrington, and Liverpool, is—

Cylinder 15-inch diameter . . .	£1,950	0	0
„ 16 „ . . .	2,113	10	0
„ 18 „ . . .	2,500	0	0

The tenders cost £500 each.

GOODS DEPARTMENT.

The duties of this department, which forms one of the most important establishments at Camden Station, may very briefly be elucidated. It appears from returns lying before us, that during the six months ending the 26th of August last, there entered and departed from Camden Station alone 73,732 railway waggon-loads of goods! Now in the annals of political economy there can, perhaps, scarcely exist a more striking exemplification of the extraordinary extent to which the latent resources of a great country may be developed by diminishing the fric-

tion, or, without metaphor, by lowering the tolls of its goods-traffic, than the fact that, notwithstanding the enormous amount thus conveyed along the London and North-Western rails, the quantity carried along the Grand Junction Canal, which meanders alongside its powerful antagonist, instead of having been drained, as might have been expected, to zero, has, from the opening of the railway in 1836 up to the present period, actually increased as follows :—

	Tons.
Average amount of goods annually moved on the Grand Junction Canal during the three years prior to the opening of the London and Birmingham Railway in 1836	756,894
Average amount of ditto annually moved during the twelve years subsequent to 1836 . .	1,039,333
Amount moved in 1847	1,163,466

But besides the innumerable arrangements necessary for the conveyance along the rails of the number of waggon-loads of goods we have have stated, the Company undertake the vexatious and intricate business of collecting and delivering these goods from and to all parts of London, as also throughout the various towns on their line, excepting Liverpool.

For the collection, loading, unloading, and delivery of a certain portion of the merchandise conveyed by the Company on their rails, the Board of Directors, who had no practical knowledge of these details, have, we think with great prudence, availed themselves of the experience of Messrs. Pickford, and of Messrs. Chaplin and Horne, whom

they have engaged as their agents at Camden Station;—the Company's Superintendent there marshalling and despatching all luggage-trains, arranging the signals, and making out the weigh-bills, etc. The undertaking is one of enormous magnitude; for besides immense cargoes of goods in large packages, an inconceivable number of small parcels are sent from Birmingham, Wolverhampton, Sheffield, etc., to numberless little retail shopkeepers in London, who are constantly requiring, say a few saucepans, kettles, cutlery, etc.; and when it is considered that for the collection, conveyance, and delivery of most of these light parcels 1*s.* only is charged, and, moreover, that for the conveyance of a small parcel by the Company's goods-trains from say Watford to Camden Station, to be there unloaded into store, thence reloaded into and transported by a spring waggon to almost any street and house in London, or to the terminus of any railway-station to which it may be addressed, the charge is only 6*d.*, it is evident that a great deal of attention and skill are necessary to squeeze a profit from charges which competition has reduced to so low a figure.

At, and for some time after, the commencement of railway traffic, it was considered dangerous to convey goods by night. They are now, however, despatched from Birmingham at 8.45 P.M., to arrive at Camden Station at 3½ in the morning. Goods from London are despatched at 9 in the evening, at midnight, at 12½, at ¼ before 1, at 3, and at 5 in the morning. In the day they are despatched at 12.40, at 1.15, at 2.6, and at 6½; and such regularity is attained, that packs of cotton, linen,

and woollen goods from Manchester are usually delivered in London almost with the regularity of letters. An immense quantity of fish from Billingsgate, and occasionally as much as twenty tons of spare fruit from Covent Garden Market, are injected into the country by the midday train: indeed the London wholesale dealers in these articles do not now fear receiving too great a supply; as, whatever may be their surplus, the railway is ready to carry it off to the manufacturing districts—Manchester alone swallowing almost any quantity; besides which, large quantities of fruit are conveyed by rail into the strong stomach of Glasgow. In return, many tons of meat in hampers, and oftentimes a flock of a hundred dead sheep, wrapped up only in cloths, are also despatched from the country to the London market.

Without tiring our readers with minute details, the following is a rough outline of the mode in which the goods-traffic is conducted.

As soon as an up luggage-train arrives at Camden Station, its loaded waggons of merchandise, which are placed under the care of the Goods Department Superintendent the moment they arrive, are, under his directions, drawn by horses along a variety of branch-rails to a certain point, where they are left by the Superintendent in the open air, from which moment Messrs. Pickford and Messrs. Chaplin and Horne,—to whom the different waggons are respectively addressed, and between whom a wholesome competition exists, highly advantageous to the public,—are held responsible by the Company for fire or accident of any sort; in short,

for their safe delivery. The waggons thus deposited by the Superintendent, solely under the canopy of heaven, are instantly approached by drivers and horses belonging to the two competing Agents, who, with great cleverness, by repeatedly twisting them on turn-tables, and then by drawing them along an apparent labyrinth of rails, conduct each species of goods to its own store, where, by experienced porters, it is immediately unloaded and despatched by spring-waggons to its destination.

As regards the down trade, the business transacted in this department, although apparently complicated, is very admirably arranged. The spring-waggons and carts of the Company's Agents,—like bees in search of honey,—with extraordinary intelligence, migrate in all directions to the various localities of the Metropolis, in search, piecemeal, of that enormous traffic, large and small, which, by every diurnal pulsation of the heart of London, is projected into our manufacturing districts; which, in return, send back to the Metropolis very nearly the same amount. Every waggon-load of merchandize thus obtained, as well as every boat-load of goods (for the Company have also at Camden Station a branch water-communication leading into the Regent's Canal), is either carted at once to the particular store-house to which it belongs, to be thence reloaded into Railway-vans, or it is brought to *"The General Receiving-Shed"* either of Messrs. Pickford or of Messrs. Chaplin and Horne; and, to prevent mistakes, all invoice-forms and truck-labels for the former firm are printed in black, those for the latter in red. In these

enormous receptacles, goods "*coming in*" are arranged on one side, those "*going out*" on the other. In Messrs. Pickford's receiving-shed, which is 300 feet in length by 217 in breadth, there are in operation, for the purpose of rapidly loading and unloading goods—

24 steam-cranes, 1 steam-doller, or lift,
21 wooden cranes, 1 travelling-crane on the roof,
1 steam-capstan, for hauling trucks along rails to the various loading bays.—We observed also at work 4 steam hay-cutters, which cut 200 trusses in four hours, and 1 steam hay-cleaner. The above machines are worked simultaneously by an engine of 16-horse power, which also raises from an Artesian well, 380 feet deep, water given warm to 222 horses in adjoining stables. These horses are all named, and branded with a number on their hoofs. In the general receiving-shed of Messrs. Chaplin and Horne there are also a series of cranes, with large stables full of horses that work about twelve hours a day; the "Weights of Goods allowed to be taken by them in each Vehicle" being as follows:—

From Camden.

	Tons.	Cwts.		Tons.	Cwts.	
4 Horses	5	0	Not to exceed	6	0	waggons.
3 Ditto	4	0	Ditto	4	10	vans.
2 Ditto	3	0	Ditto	3	5	vans.
1 Ditto	1	10	Ditto	1	15	carts.

By the very great powers committed by the Company to their two Agents, fifty waggon-loads of merchandise, collected and brought by spring-waggons to Camden Station, have often, within two hours, been despatched

by the Superintendent to the manufacturing districts. During the day, as fast as the spring-waggons arrive their contents are unloaded, and either left on the covered platform of the building, or ranged around the walls in large compartments, labelled *Glasgow, Birmingham, Manchester, Leicester, Nottingham, Coventry,* etc.; and as on the great Square of Valetta, at Malta, one sees congregated the costumes of almost every merchant upon earth, so do these receiving-sheds display goods and chattels of almost every description. Here lies a waggon-load of beer from Chester,—there, another of sugar-loaves, in blue paper, for Northampton,—of groceries for Buckingham,—cheeses, millinery, and gas-pipes for Peterborough,—a van-load of empty hosiery skips (baskets) to return to Leicester,—empties for Glasgow,—filberts for Birmingham, etc.: and as the goods are coming in as fast as they are going out, the colours of this kaleidoscopic scene are constantly changing. Indeed, during the short time we were ruminating on the strange chance-medley of objects before us, fourteen truck-loads of goods were unladen, and eight spring waggons loaded and despatched.

The amount of business transacted in each of these great receiving-sheds every evening, from seven till about ten o'clock, is quite astonishing. On Messrs. Pickford's great elevated platform,—which at that time appears laden with goods of all descriptions,—several clerks, each protected by a sort of rough arbour of iron rods, and lighted by gas, are seen, in various localities, sitting before little desks, towards which porters from

all directions are wheeling, on trucks, different articles which have just been unloaded from a series of spring-vans, the bottoms of which are nearly on a level with the platform. The drivers of these carriages, entering the building at a large gate, twist, turn, and then back their horses, with a dexterity which an unpractised person would think it impossible for men and animals to attain: "*Now then!*" and "*All right!*" being almost the only vociferations to be heard. As fast as the goods can be unladen from the spring-waggons to the platform, a porter lustily calls out the address on each bale or parcel, which is actively registered by a clerk. These invoices are then briskly sent across to the other side of the platform, in order that each article enumerated therein, when reloaded—as it almost immediately is, into railway-waggons—may be ticketed off, to ascertain whether every package taken in at the receiving side of the platform has *bonâ fide* been safely despatched from the other.

Until the visitor has had some time, first to recover from his astonishment, and then to observe, analyze, and reflect on the various arrangements simultaneously in operation before him, the picture altogether is really astounding. For from one side of the platform a set of active porters are centripetally wheeling, from different spring-waggons, innumerable packages to the recording clerks, as eagerly as from these clerks (whose duty it is to record the weight of every article, and to affix to it the Company's printed charge for conveyance to its address) other porters, equally active, are con-

trifugally wheeling other packages to various railway-vans, which, as fast as they can be filled, are drawn away from the despatching side of the platform, and immediately replaced by empty ones. To a recording clerk one set of porters are wheeling a waggon-load of raw silk, valued at £9000, from China, which, *viâ* the South-Western Railway, has just arrived from Southampton to go to Macclesfield to be manufactured; another set, Russian tallow, in casks; others, draperies; another set, yarns for Gloucester. One porter has on his truck a very small but heavy load of iron or lead; another, with comparative ease, is wheeling through the crowd a huge wool-bag, large enough to contain, if properly packed, a special jury. Here comes a truck of mustard, in small casks, followed by another full of coffee; there goes a barrow-load of drugs—preceding a cask of spirits; which, to prevent fraud, has just been weighed, tapped, gauged, and sampled; also several trucks full of household furniture; the family warming-pan having been tacked round the body of the eight-day clock, etc. This extraordinary whirl of business, set to music by the various noises proceeding from the working of the steam-cranes, steam-doller, steam-capstan, common cranes, and other machinery above the platform, —from the arrival, turning, backing, and departure of spring-waggons beneath it,—from the rumbling of the porters' trucks crossing the platform, as also of the railway-vans as, laden with goods, they are successively rolled away, — forms altogether, we repeat, a scene which though rarely visited, is astounding to witness,

and which, we are sensible, we have but very faintly described. But, besides the amount of business above mentioned, daily transacted in each of the Agents' great "receiving-sheds," there are nine other sheds, in which, throughout the day, and especially at night, the same process on a smaller scale is going on. Close to these stores there is also a water-dock, for iron and heavy goods to be shipped for the Thames. The carting establishments of Messrs. Pickford and Chaplin for the collection and delivery of their share only of the goods-traffic—for the Company have establishments of their own for loading and unloading at every station except London—would appear to any foreigner unacquainted with the powers with which the mercantile business of England is quietly transacted, to be incomprehensible and almost incredible. For instance—

Messrs. Pickford's establishment on account of the London and North-Western Railway, is as follows:—

Clerks.	Porters.	Horses.	Vans.	Waggons.	Drays.
234	538	396	82	57	25

The weights carted by Messrs. Pickford, on account of the Company, for the year ending the 30th of June last, amounted to—

	Tons.	cwts.	qrs.	lbs.
Collected	133,437	18	0	15
Delivered	139,898	19	0	5
Making a gross total of	273,336	17	0	20

Or rather more than 841 tons per day.

As soon as the two Agents, at their respective receiving-sheds, have loaded and securely covered their

trucks with water-proof and fire-proof tarpaulins, they turn them out, labelled, into the open air, from which moment they are considered to be in the hands of the Company's Superintendent of the goods department. Accordingly, under his direction, they are immediately drawn by horses, first over a weighbridge to receive their weighbills, and thence to a series of ten turn-tables, by which they are scattered among thirteen sets of rails, where they are marshalled into trains for their respective destinations. In this operation, it is alarming to see the Superintendent's horses dragging the various luggage-vans; for not only are the rails, as well as the pavement between them, exceedingly slippery, but as the carriages have no shafts, the poor horse has not power to stop his load; and accordingly, affixed to it by his traces, he trots away before it, until it appears as if he must inevitably be smashed to a sandwich between it and the carriage at rest, which he is approaching; however, *just* before the collision between the buffers of each vehicle takes place, the dull-looking animal jumps aside, and very dexterously saves himself from annihilation. The luggage-trains thus formed are composed sometimes of ninety or a hundred waggons, weighing when empty about three tons each, and averaging when laden about six tons. At the rear of each of these trains sits a guard. The Company's goods-waggons, of all descriptions, amount in number to 6236.

ENGINE STABLE.

In order to prevent the locomotive engines which

draw these luggage-trains from crossing, or otherwise perilling the main passenger-line at Camden Station, there has been constructed an immense rotunda, one hundred and sixty feet in diameter, lighted from the top by plates of glass nine feet in length by half an inch thick, and capable of containing twenty-four of the largest-class engines. In the centre of this great brick building there is a turn-table forty feet in diameter, from whence the engines radiate to their twenty-four stalls, which on a large scale much resemble those constructed in a stable for hunters. The majority of these locomotives are capable of drawing 600 tons at the rate of twelve miles an hour. Each, when supplied with coke and water, with steam up, ready for its journey, weighs about fifty tons. At the entrance of this building is a pit into which, after their journey, they drop their fire; and between the rails, in each of the twenty-four stalls, we observed a smaller pit, to enable artificers to work beneath any engine that may require reparation. The drivers of these huge locomotives, after every journey, inspect and report in a book, as in the passenger-trains, any repairs that may be required; and the engines are thoroughly cleaned every time they come in.

At a short distance from this rotunda we observed a platform about three hundred yards long, constructed for the landing of cattle, which arrive there generally on Thursdays and Saturdays from two P.M. till midnight. Fifty waggon-loads of bullocks, sheep, or pigs, can here be unloaded at a time, and then driven into strong pens or pounds, constructed in the rear. The Company's

cattle and merchandise-waggons are usually painted blue, their sheep-waggons green. On the arrival of a train of cattle it is interesting to see such a quantity of polished horns, bright eyes, streams of white breath, and healthy, black, wet noses, projecting above the upper rail of their respective waggons; and fatal as is the object of their visit to John *Bull's* Metropolis, it is some consolation to reflect that—poor things—they are, at all events, in ignorance of the fate that awaits them. In disembarking the cattle, in spite of every precaution, an infuriated wild Irish bullock, will occasionally escape from this platform, and by roaring, jumping, and galloping, with depressed head and upstretched tail—

> "Hereditary bondsmen! know ye not,
> Who would be free, himself must strike the blow!"

creates no small consternation as well as confusion among the green-coated pointsmen, porters, and policemen, in charge of the various sets of tributary rails which flow from the waggon department into the main line. Instead, however, of attempting, as in the case of Mr. Smith O'Brien, to capture the fugitive by force, this object is effected by the simple stratagem of instantly turning loose several other black-nosed bullocks, which he no sooner sees, than running and galloping towards the herd, he is quietly driven with them into a pen, where he appears quite to enjoy "the Union" which a few minutes ago he had so violently and so vociferously attempted to "*repale*."

WAGGON HOSPITAL.

Among the large establishments at Camden Station is one for the maintenance and repair of the luggage-trucks and goods-carriages of the Southern District; namely, from London to Birmingham—in which alone there are 2000 luggage-waggons, with a proportionate number of trucks. The construction-shop for this department, in which 129 men were at work, is 437 feet in length by 64 in breadth. With its sideways it is capable of containing and of repairing, at one time, a hundred carriages; the average number in hospital being, however, from sixty to seventy. In the smiths' shop we observed, working at once, fourteen common forges, blown by steam; also four portable ones. In locked-up vaulted stores adjoining were lying, besides deals and Memel planks, £4000 worth of oak timber in scantlings of the various sizes required, each lot ticketed with its dimensions. It is surprising to observe the quantity of iron and oak timber used in the construction of the Company's luggage-trucks. Nevertheless, although they are built infinitely stronger in proportion than any ship (for their oak stanchions, being straight instead of curved, when they come in collision strike end foremost), yet we witnessed results of accidents which were really appalling; in many cases the largest of these timbers had been splintered: indeed, in a railway smash the British oak usually either stands the shock without flinching, or, if it *does* give, shivers into atoms. Barring, how-

ever, accidents, a luggage-truck or waggon will last about twelve years.

Among the Company's goods-carriages we observed eight powder-magazines, constructed under a patent invention of the Superintendent, Mr. Henson. They were covered outside with sheet iron, lined with wood, had leaden floors, and the axles were cased with hornbeam to prevent vibration. With these precautions they each safely convey four tons and a half of gunpowder through and over the sparks of fire and red-hot coals that are continually, during the progress of a train, flying from the funnel-pipe or dropping from the furnace of the engine.

As soon as a luggage-train has been unloaded at Camden Station, all the wheels of the waggons are gauged, to see that there are no bent axles, and that none of the "journals," or working-ends of the axles, have been heated,—for they sometimes get red-hot: and we may here remark that, under heavy loads, the tremendous vibration of the axles of goods-carriages during their journeys, materially alters the composition of the iron; and that when the axles have once been red-hot, although after cooling they are as strong as ever, they are always particularly liable to get red-hot again; in which case the brass boxes amalgamating with the iron, the ends of the largest axles are occasionally wrenched off as one would break a carrot. The luggage-waggons are minutely inspected on arriving and on departing from Camden, Wolverton, and Rugby; besides which the guard hastily examines them at every station, where they are also greased if required.

THE POINTSMAN.

Among the servants of a railway company, or rather we should say of the public, there is no one who, in his secluded station, has more important duties to attend to than "the pointsman," in charge of the switches for diverting a train from one set of rails to another; and as it is of course necessary that these switches should be carefully worked and guarded by night, as well as by day, there are usually appointed to each station two pointsmen, each of whom remains on duty twelve hours at a time, taking the night and day-work week about. At Camden Station one of these men has fourteen switches to attend to, and at Wolverton thirteen pairs. At the latter place, to prevent intrusion and to increase precaution, the pointsman has always the signal of danger on; but on perceiving an up train about a mile off, he shows a green flag to the Station signal-man, and does not avert that of danger until he has received answer that "all is right." In thick weather he himself works a subterranean auxiliary signal five hundred yards off, showing lamps of different colours. In a fog, to prevent any train running into the Station, a man is sent down the line about a mile, to affix upon the rails, every two hundred yards, one of Toy and Hansom's patent fog-signals, which, exploding under the engine with the report of a small cannon, warns the driver to stop and remain where he is, until some one comes to give him orders. At Crewe Station—from whence radiate three important lines of rails; namely, on the right, to Manchester;

straight on, to Liverpool; and on the left, to Chester, —there are constantly on duty three pointsmen; one of whom has seventeen pairs of points to attend to; namely, five belonging to the Chester line, one to the Liverpool, eleven to the workshops. His box stands between the Liverpool and Chester lines.

Nothing can apparently be more cheerless than the existence of these poor fellows, who, cut off from society, have, in solitude, in all weathers and in all seasons to perform duties for which no passing traveller ever thanks them, and which he probably does not even know that they perform. It is, however, providentially decreed that the human heart warms under almost every description of responsibility; and, accordingly, we invariably found these pointsmen not only contented, but apparently intently interested in their important duties; indeed the flowers which we observed blooming around their little wooden habitations were not, we felt, unappropriate emblems of the happiness which naturally springs up in the heart of every man who will honestly perform the duties of his station. The Company's pointsmen have nominally not very high wages;—a gratuity, however, every twelve months is given to them, provided they cause no accident; but should one occur from their switches, no matter how small, they forfeit it.

WOLVERTON.

Flying by rail through green fields below Harrow Hill and thence to Watford,—stopping for a moment in a

deep chalk cutting to hear a man cry "*Tring!*" and a bell say "*Ring!*" until the passenger gets so confused with the paltry squabble that he scarcely knows which of the two competitors is vociferating the substantive and which the verb,—we will now conduct our readers to the Station and little town of Wolverton.

As every city, village, or hamlet on the surface of the globe is usually inhabited by people of peculiar opinions, professions, character, tastes, fashions, follies, whims, and oddities, so there is always to be witnessed a corresponding variety in the *alignement* and architecture of their dwellings;—the forms and excrescences of each often giving to the passing traveller a sort of phrenological insight into the character of the inmates. One street, inhabited by poor people, is as crooked as if it had been traced out by the drunken Irishman, who, on being kindly questioned, in a very narrow lane, across which he was reeling, as to the length of road he had travelled, replied, "*Faith! it's not so much the length of it as the* BREADTH *of it that has tired me!*" Another —a rich street—is quite straight. Here is a palace—there are hovels. The hotel has one shape—the stock-exchange another. There are private houses of every form, shops of every colour, columns, steeples, fountains, obelisks *ad infinitum*. Conspicuous over one door appear a golden pestle and mortar; from another projects a barber's pole; a hatchment decorates a third, the Royal Arms a fourth: in short, it would be endless to enumerate the circumstantial evidence which, in every direction, proves the truth of the old saying, "*Many men, many minds.*"

To all general rules however there are exceptions; and certainly it would be impossible for our most popular auctioneer, if he wished ever so much to puff off the appearance of Wolverton, to say more of it than that it is a little red-brick town composed of two hundred and forty-two little red-brick houses,—all running either this way or that way at right angles,—two tall red-brick engine-chimneys, a number of very large red-brick workshops, six red houses for officers, one red beershop, two red public-houses, and, we are glad to add, a substantial red school-room, and a neat red-brick church;—the whole lately built by the order of a Railway Board, at a Railway Station, by a Railway contractor, for Railway men, Railway women, and Railway children: in short, the round cast-iron plate over the door of every house bearing the letters L. N. W. R., is the generic symbol of the town. The population is 1405, of whom 638 are below sixteen years of age. All look for support to "the Company," and not only their services and their thoughts but their parts of speech are more or less devoted to it; for instance, the pronoun "*she*" almost invariably alludes to some locomotive engine, "*he*" to the Chairman, "*it*" to the London Board. At Wolverton the progress of time itself is marked by the hissing of the various arrival and departure-trains. The driver's wife, with a sleeping infant at her side, lies watchful in her bed until she has blessed the passing whistle of "the down mail." With equal anxiety her daughter, long before daylight, listens for the rumbling of "the 3½ A.M. goods up," on the tender of which lives the ruddy but

smutty-faced young fireman to whom she is engaged. The blacksmith as he plies at his anvil—the turner as he works at his lathe, as well as their children at school, listen with pleasure to certain well-known sounds on the rails, which tell them of approaching rest.

The workshops at Wolverton, taken altogether, form, generally speaking, an immense hospital or "Hôtel des Invalides" for the sick and wounded locomotive engines of the Southern District. We witnessed sixty undergoing various operations, more or less severe, at the same time. Among them was Crampton's new six-wheel engine, the hind wheels of which are eight feet high, weighing thirty-eight tons, and with its tender sixty tons. It is capable of drawing at the usual speed twelve carriages laden with passengers. The workshops at this Station are so extensive, that it would be tedious, and indeed almost impracticable, to describe them in detail; we will therefore merely mention that in one of them we saw working at once, by the power of an eighteen horse steam-engine, twelve turning-lathes, five planing machines, three slotting-machines, two screw-bolt ditto—and, as a trifling example of the undeviating accuracy with which these contrivances perform, we may state that from a turning-lathe a shaving from cold iron will sometimes continue to flow for forty feet without breaking. There are a large cast-iron foundry, a brass foundry, machines for grinding, and also for polishing; sheers for cutting, and stamps for punching cold iron as if it were pasteboard; an immense oven for heating tires of wheels; a smith's shop containing twenty-four

forges, all of which were in operation at once. Two steam-engines—one for machinery, the other for pumping water for the town and offices only, for the Company's well-water here, as at Camden Station, disagrees with the locomotives. A large finishing-store, in which were working by steam, fifteen turning-lathes, five slotting machines, five planing ditto, one screwing ditto, two drilling ditto, two shaving ditto. Beneath the above we entered another workshop containing sixteen turning-lathes, two drilling-machines, one slotting ditto, one screwing ditto, one nut ditto, one cylinder-boring ditto, one sharping ditto. In the great store-yard there is an hydraulic power of two hundred tons for squeezing wheels on to their axles, or wrenching them off. Another workshop is filled with engines undergoing repair, and adjoining it a large store or pharmacopœia, containing, in the form of oil, tallow, nuts, bars, bolts, etc., all the medicine which sick locomotives occasionally require.

At a short distance towards the south we entered a beautiful building, lighted during the day by plate-glass in the roof, by gas at night, and warmed by steam. In its centre there stands a narrow elevated platform, whereon travels a small locomotive, which brings into the building, and deposits on thirteen sets of rails on each side, twenty-six locomotive engines for examination and repair. On the outside, in the open air, we found at work what is called "*a scrap drum,*" which by revolving, cleans scraps of old rusty iron, just as a public school improves awkward boys by hardly rubbing them one against another. The scrap iron, after having been

by this discipline divested of its rust, is piled on a small wooden board for further schooling; and when sufficiently hot, the glowing mass is placed under a steam-hammer alongside, whose blows—each equal to about ten tons—very shortly belabour to "equality and fraternity" the broken bolts, bars, nuts, nails, screw-pins, bits of plate-iron, etc., which are thus economically welded into a solid mass or commonwealth. In another smelting-shop, 150 feet in length, we saw at work fourteen forges, six turning-lathes, one drilling-machine, and one iron-shaving machine. Lastly, there are gas-works for supplying the whole of the Company's establishment with about 70,000 or 80,000 cubic feet of gas per day.

The above is but a faint outline of the Company's Hospital at Wolverton, for the repair and maintenance merely, of their locomotive engines running between London and Birmingham.

The magnitude of the establishment will best speak for itself; but as our readers, like ourselves, are no doubt tired almost to death of the clanking of anvils—of the whizzing of machinery—of the disagreeable noises created by the cutting, shaving, turning and planing of iron—of the suffocating fumes in the brass-foundry, in the smelting-houses, in the gas-works—and lastly of the stunning blows of the great steam-hammer—we beg leave to offer them a cup of black tea at the Company's public Refreshment-room; in order that, while they are blowing, sipping, and enjoying the beverage, we may briefly explain to them the nature of this beautiful little oasis in the desert.

WOLVERTON REFRESHMENT-ROOM.

In dealing with the British nation, it is an axiom among those who have most deeply studied our noble character, that to keep John Bull in beaming good-humour it is absolutely necessary to keep him always *quite full.* The operation is very delicately called "*refreshing him;*" and the London and North-Western Railway Company having, as in duty bound, made due arrangements for affording him, once in about every two hours, this support, their arrangements not only constitute a curious feature in the history of railway management; but the *dramatis personæ* we are about to introduce, form, we think, rather a strange contrast to the bare arms, muscular frames, heated brows, and begrimed faces of the sturdy workmen we have just left.

The Refreshment establishment at Wolverton is composed of—

1. A matron or generalissima.
2. Seven very young ladies to wait upon the passengers.
3. Four men and three boys, ditto, ditto.
4. One man-cook, his kitchen-maid, and his two scullery-maids.
5. Two housemaids.
6. One still-room maid, employed solely in the liquid duty of making tea and coffee.
7. Two laundry-maids.
8. One baker and one baker's-boy.
9. One garden-boy.

And lastly, what in the books of the establishment is most significantly described—

10. "An odd man."

"Homo sum, humani nihil à me alienum puto."

There are also eighty-five pigs and piglings, of whom hereafter.

The manner in which the above list of persons, in the routine of their duty, diurnally revolve in the "scrap-drum" of their worthy matron, is as follows:—Very early in the morning—in cold winter long before sunrise—"the odd man" wakens the two house-maids, to one of whom is entrusted the confidential duty of awakening the seven young ladies exactly at seven o'clock, in order that their "*première toilette*" may be concluded in time for them to receive the passengers of the first train, which reaches Wolverton at 7h. 30m. A.M. From that time until the departure of the passengers by the York Mail train, which arrives opposite to the Refreshment-room at about eleven o'clock at night, these young persons remain on duty; continually vibrating, at the ringing of a bell, across the rails—(there is a covered passage high above them, but they never use it)—from the North Refreshment-room for down passengers, to the South Refreshment-room constructed for hungry up-ones. By about midnight, after having philosophically divested themselves of the various little bustles of the day, they are all enabled once again to lay their heads on their pillows, with the exception of one, who in her turn, assisted by one man and one boy

of the establishment, remains on duty receiving the money, etc., till four in the morning, for the up-mail. The young person, however, who in her weekly turn performs this extra task, instead of rising with the others at seven, is allowed to sleep on till noon,—when she is expected to take her place behind the long table with the rest.

The scene in the Refreshment-room at Wolverton, on the arrival of every train, has so often been witnessed by our readers, that it need hardly be described. As these youthful handmaidens stand in a row behind bright silver urns, silver coffee-pots, silver tea-pots, cups, saucers, cakes, sugar, milk, with other delicacies over which they preside, the confused crowd of passengers simultaneously liberated from the train hurry towards them with a velocity exactly proportionate to their appetites. The hungriest face first enters the door, "magnâ comitante catervâ," followed by a crowd very much resembling in eagerness and joyous independence the rush at the prorogation of Parliament of a certain body following their leader from one House to the bar of what they mysteriously call "another place." Considering that the row of young persons have among them all only seven right hands, with a thumb and four very little fingers at the end of each, it is really astonishing how, with such slender assistance, they can in the short space of a few minutes manage to extend and withdraw them so often—sometimes to give a cup of tea—sometimes to receive half-a-crown, of which they have to return two shillings—then to give an old gentleman a plate of warm soup—

then to drop another lump of sugar into his nephew's coffee-cup—then to receive a penny for a bun, and then again threepence for four "lady's fingers." It is their rule as well as their desire never, if they can possibly prevent it, to speak to any one; and although sometimes, when thunder has turned the milk, or the kitchen-maid over-peppered the soup, it may occasionally be necessary to soothe the fastidious complaints of some beardless ensign by an infinitesimal appeal to the generous feelings of his nature—we mean, by the hundred-thousandth part of a smile—yet they endeavour on no account ever to exceed that harmless dose. But while they are thus occupied at the centre of the refreshment-table, at its two ends, each close to a warm stove, a very plain matter-of-fact business is going on, which consists of the rapid uncorking of, and then emptying into large tumblers, innumerable black bottles of what is not unappropriately called "*Stout*;" inasmuch as all the persons who are drinking the dark foaming mixture wear heavy great-coats, with large wrappers round their necks—in fact, are *very* stout. We regret to have to add, that among these thirsty customers are to be seen, quite in the corner, several silently tossing off glasses of brandy, rum, and gin; and although the Refreshment-room of the Wolverton Station is not adapted for a lecture, we cannot help submitting to the Managers of the Company, that considering not only the serious accidents that may occur to individual passengers from intoxication, but the violence and insolence which drunken men may inflict upon travellers of both sexes, whose misfortune it may be to

be shut up with them; considering moreover the ruin which a glass or two of brandy may bring upon a young non-commissioned officer in the army, as also the heavy punishment it may entail upon an old soldier, it would be well for them peremptorily to forbid, at all their refreshment-rooms, the sale by any of their servants, to the public, of ardent spirits.

But the bell is violently calling the passengers to "*Come! come away!*" and as they have all paid their fares, and as the engine is loudly hissing, attracted by their pockets as well as by their engagements, they soon, like the swallows of summer, congregate together, and then fly away.

It appears from the books that the annual consumption at the Wolverton refreshment-rooms averages,—

182,500		Banbury cakes.	5,110		lbs. of moist sugar.
56,940		Queen cakes.	16,425		quarts of milk.
29,200		pâtés.	1,095	„	cream.
36,500		lbs. of flour.	17,520		bottles of lemonade.
13,140	„	butter.	35,040	„	soda-water.
2,920	„	coffee.	70,080	„	stout.
43,800	„	meat,	35,040	„	ale.
5,110	„	currants.	17,520	„	ginger-beer.
1,277	„	tea.	730	„	port.
5,840	„	loaf-sugar.	3,650	„	sherry.

And, we regret to add,—

730		bottles of gin.
731	„	rum.
3,366	„	brandy.

To the eatables are to be added, or driven, the eighty-five

pigs, who, after having been from their birth most kindly treated and most luxuriously fed, are impartially promoted, by seniority, one after another, into an infinite number of pork-pies.

Having, in the refreshment sketch which we have just concluded, partially detailed the duties of the seven young persons at Wolverton, we feel it due to them by a very few words to complete their history. It is never considered quite fair to pry into the private conduct of any one who performs his duty to the public with zeal and assiduity. The warrior and the statesman are not always immaculate; and although, at the Opera, ladies undeniably sing very high, and in the ballet kick very high, it is possible that their voices and feet may sometimes reach rather higher than their characters. Considering, then, the difficulties which our seven young attendants have to perform,—considering the temptations to which they are constantly exposed, in offering to the public attentions which are ever to simmer and yet never to boil, it might be expected that our inquiries should considerately go no further than the arrival at eleven P.M. of "the up York mail." The excellent matron however in charge of these young people—who always dine and live at her table—with honest pride declares that the breath of slander has never ventured to sully the reputation of any of those who have been committed to her charge; and as this testimony is corroborated by persons residing in the neighbourhood, and very capable of observation, we cannot take leave of the establishment without expressing our approbation of the good sense

and attention with which it is conducted; and, while we give credit to the young for the character they have maintained, we hope they will be gratefully sensible of the protection they have received.

Postscript.—We quite forgot to mention that, notwithstanding the everlasting hurry at this "tea-and-turn-out" establishment, four of the young attendants have managed to make excellent marriages, and are now very well off in the world.

GARDENS, LIBRARIES, AND SCHOOLS.

Before leaving Wolverton Station, our readers will no doubt be desirous to ascertain what arrangements, if any, are made by the Company for the comfort, education, and religious instruction of the number of artificers and other servants whom we have lately seen hard at work. On the western boundary of the town we visited 130 plots of ground, containing about 324 square yards each, which are let by the Company, at a very trifling rent, to those who wish for a garden; and accordingly, whenever one of these plots is given up, it is leased to him whose name stands first on the list of applicants. A reading-room and library, lighted by gas, are also supplied free of charge by the Company. In the latter there are about seven hundred volumes; and the list of papers, etc., in the reading-room was as follows:—'Times,' 'Daily News,' 'Bell's Life,' 'Illustrated News,' 'Punch,' 'Weekly Dispatch,' 'Liverpool Albion,' 'Glasgow Post,' 'Railway Record,' 'Aris's Birmingham Gazette,' 'Bentley's Miscel-

lany,' 'Chambers' Journal,' 'Chambers' Shilling Volume,' 'Practical Mechanic's Journal,' 'Mechanic's Magazine.'

Besides the above, there is maintained for the clerks, porters, policemen, as also for their wives and families, residing at the various stations, a flying library of about six hundred volumes, on all subjects excepting politics and religious controversies, despatched to the various stations, carriage free, in nineteen boxes, given by the Company, each of which can contain from twenty to fifty volumes. For the education of the children of the Company's servants, a school-house has been constructed on a healthy eminence, surrounded by a small court and garden. In the centre there is a room for girls, who from nine till five are instructed by a governess in reading, writing, arithmetic, geography, grammar, history, and needlework. Engaged at these occupations we counted fifty-five clean, healthy faces, and in the east wing about ninety fine, stout, athletic boys, of various ages, employed in the studies above-mentioned (excepting the last), and learning moreover mathematics and drawing. One boy we saw solving a quadratic equation; another was engaged with Euclid; others were studying land-surveying, levelling, trigonometry, and one had reached conic sections.

On entering the infant-school, which is under the superintendence of an intelligent-looking young person of about nineteen years of age, we were surprised at the accurate segments in which the little creatures were standing in groups around a tiny monitor occupying the centre of each chord. We soon however detected that

this regularity of their attitudes was caused by the insertion in the floor of various chords of hoop iron, the outer rims of which they all touch with their toes. A finer set of little children we have seldom beheld; but what particularly attracted our attention was three rows of beautiful babies, sitting as solemn as judges, on three steps one above another, the lowest being a step higher than the floor of the room. They were learning the first hard lesson of this world, namely to sit still; and certainly the occupation seemed to be particularly well suited to their outlines; indeed their pinafores were so round, and their checks so red, that altogether they resembled three rows of white dumplings, with a rosy-faced apple on each. The picture was most interesting; and we studied their cheerful features until we almost fancied that we could analyze and distinguish which were little fire-flies, which small stokers, tiny pokers, infant artificers, etc.

On leaving the three rooms-full of children, to whom, whatever may be the religion of their parents, the rector, the Rev. G. Weight, is apparently devoting very praiseworthy attention, we proceeded eastward about a hundred yards to the church, the interior of which is appropriately fitted up with plain oak-coloured open seats, all alike. In the churchyard, which is of very considerable area, we observed, under the north wall, a row of fraternal mounds side by side, with a solitary shrub or a few flowers at the foot of each, showing that those who had there reached their earthly terminus were kindly recollected by some one still travelling on the rails of life.

With the exception however of the grave of one poor fellow, whose death under amputation, rendered necessary from severe fractures, has been commemorated by his comrades on a tombstone, there exists no other epitaph. Besides this church, a room in the library is used, when required, as a Wesleyan Chapel, at which on Sundays there are regular preachers, both morning and night; and on Tuesdays and Fridays about a hundred of the Companys servants attend prayers delivered extempore by one of their brother artificers.

LETTERS AND NEWSPAPERS.

Among the manifold arrangements which characterize the interior of the British hive, there is, we believe, no one that offers to an intelligent observer a more important moral than the respect which is everywhere paid by us to the correspondence of the nation. Prior to the introduction of railways, our Post-office establishment was the admiration of every foreigner who visited us. But although our light mail-coaches, high-bred horses, glittering harness, skilful coachmen, resolute guards, and macadamized roads were undeniably of the very best description, yet the moral basis on which the whole fabric rested, or rather the power which gave vitality to its movements, evidently was a patriotic desire, indigenous in the minds of the people of all classes, to protect, as their common wealth, the correspondence of the country; and, accordingly, it mattered not whether on our public thoroughfares were to be seen a butcher's cart, a brewer's dray,

a bishop's coach, a nobleman's landau, the squire's chariot, or his tenant's waggon;—it mattered not what quantity of vehicles were assembled for purposes good, bad, or indifferent, for church, for race-course, or for theatre; it mattered not for what party of pleasure, or for what political purpose a crowd or a mob might have assembled; for at a single blast through a long tin horn people of all ranks and conditions, however they might be disposed to dispute on all other subjects, were ready from all quarters to join together in exclaiming, "MAKE WAY FOR THE MAIL!"

At the magic whistle of the locomotive-engine, the whole of the extremely slow, dull, little-bag system we have just referred to suddenly fell to pieces. Nevertheless, the spirit that had animated it flew from the road to the rails; and, accordingly, there exists throughout the country the same honest anxiety that our letter-bags should be circulated over the surface of the United Kingdom with the utmost possible care and despatch.

The difficulty, however, of transmitting from London to every part of the United Kingdom, and *vice versâ*, the innumerable quantity of letters which, like mushrooms springing up from a bed of spawn, have arisen from our sudden adoption of a penny-postage, would alone require minute calculations, involving an infinity of details; but when it is considered that besides this increased circulation from and to the heart of the Metropolis—(the average weight of letters and newspapers carried daily by the London and North-Western Railway is seventeen tons)—there exists a similar increase in cross circulation,

not only from and to every great city and town, but from every little post-office to every part of the United Kingdom, and *vice versâ*, and, moreover, to every region on the globe, the eccentric zigzag courses of all these letters to their respective destinations may truly be compared to the fiery tracks and sparks created by the sudden ignition of a sackful of fireworks of all descriptions; some flying straight away, while others are revolving, twisting, radiating, bouncing, exploding in every possible direction, and in all ways at once.

To explain the mode in which our postal arrangements are conducted would not only exceed our limits, but be foreign to our subject; we will, therefore, only attempt to supply our readers with a slight sketch of a very small portion of this business, namely the transmission of letters from the Metropolis by the London and North-Western Railway's night mail.

While the passengers by the Lancashire mail-train are taking their seats and making other preparations for their departure, two or three Post-office vans are seen to enter the main carriage-gate of the Euston Station, and then to drive close to their tenders on the railway, which form the last carriages of the train. The servants of the Post-office, rapidly unloading their vans, remove a portion of the bags they contained into the travelling office, and the remainder into two large tenders, which, as soon as they are filled, are locked up by the guard, who then takes his place in the flying-office, and no sooner has he started than another flying post-office, which had been lying in ambush, advances with its tender to be loaded

in a similar manner, and in a quarter of an hour they are despatched to Yorkshire and the East of Scotland.

* * * *

It had been raining for upwards of twenty-four hours, and it was still pouring, when, at about half-past one o'clock of a dark winter's night, we reached the railway platform at Stafford, to await there the arrival from Euston Station of the night-mail, whose loading and departure we have just described. At that lonely hour, excepting a scarlet-coated guard, who, watching over a pile of letter-bags just arrived from Birmingham by a branch train, was also waiting for the down mail, there were no other passengers on the platform; and save the unceasing pattering of the rain there appeared nothing to attract the attention but the glaring lamps of three or four servants of the Company. One with his lantern in his left hand was writing in a small memorandum-book placed on a desk before him. Two others, with lights suspended round their necks, were greasing the axles of some carriage whose form could not be distinguished, while the station-man on duty, with his lamp in his hand, was pacing up and down the boarded platform. At this moment the signal-man had scarcely announced the approach of an up train, when there rapidly rushed by a very long, low, dark, solid mass, protected by some sort of wet black-looking covering, which here and there glistened as it rolled past the four lamps that were turned towards it; in short, it was a common luggage-train. The whole line of waggons, their various contents, as well as the powerful puffing engine that was dragging them

through utter darkness, were all inanimate; and it was appalling to reflect that, in case of any accident to the drivers, the great train, with two red eyes shining in front as well as in rear, would proceed alone on its dark iron path—lifeless—senseless—reckless of human life—unconscious of the agonies it might cause, or the mischief it might create. It was the work of man—and yet it was ignorant of his power, or even of his name. Devoid of reason or of instinct, it knew nothing—saw nothing—heard nothing—loved nothing—hated nothing—cared for nothing—had no pleasures—no pains—nothing to fear—nothing to hope for; it knew not whence it came, —it rushed forwards it knew not why,—to go it knew not where; it had substance, it had motion, it produced loud sounds, and yet it was as lonely and as destitute of life as the heavens and the earth, when, in chaos, they were without form and void, and when darkness was upon the face of the deep! But these reflections were agreeably interrupted by the arrival of a down train, swarming alive with passengers, whose busy feet were very shortly to be heard trampling in all directions along or across the platform. At the same time, the conductor of the train was delivering over to the Post-office guard, who had so patiently been awaiting their arrival, a quantity of leather bags of all sizes,—white, brown, or black, according to their ages,—and which remained in a large heap on the platform, until in about eight minutes the signal-bell announced first the approach and then the arrival of "the down London mail." As soon as this train, which we had been awaiting, stopped, the door of

the flying post-office was opened, and the bags which had been lying on the platform were no sooner packed, either into it or into its tender behind, than the engine-driver's whistle, announcing the immediate departure of the train, we without delay presented an order which we had obtained to travel in the post-office from Stafford to Crewe, and we were scarcely seated in a corner, on some letter-bags, to witness the operations of its inmates, when the train started, and away we went!

THE FLYING POST-OFFICE.

This office, which every evening flies away from London to Glasgow, and wherein Government clerks are busily employed in sorting, receiving, and delivering letters all the way, is a narrow carpeted room, twenty-one feet in length, by about seven in breadth, lighted by four large reflecting lamps inserted in the roof, and by another in a corner for the guard. Along about two-thirds of the length of this chamber, there is affixed to the side wall a narrow table, or counter, covered with green cloth, beneath which various letter-bags are stowed away, and above which the space, up to the roof, is divided into six shelves, fourteen feet in length, each containing thirty-five pigeon-holes, of about the size of the little compartments in a dove-cote. At this table, and immediately fronting these pigeon-holes, were standing, as we flew along, three Post-office clerks, intently occupied in snatching up from the green-cloth counter, and in dexterously inserting into the various pigeon-holes, a mass of

letters which lay before them, and which, when exhausted, were instantly replaced from bags, which the senior clerk cut open, and which the guard who had presented them then shook out for assortment. On the right of the chief clerk the remaining one-third of the carriage was filled nearly to the roof with letter-bags of all sorts and sizes, and which an able-bodied Post-office guard, dressed in his shirt-sleeves and laced waistcoat, was hauling at and adjusting, according to their respective brass-labels. At this laborious occupation the clerks continue standing for about four hours and a half; that is to say, the first set sort letters from London to Tamworth; the second from Tamworth to Preston; the third from Preston to Carlisle; and the fourth, letters from Carlisle to Glasgow. The clerks employed in this duty do not permanently reside at any of the above stations, but are usually removed from one to the other every three months.

As we sat reclining and ruminating in the corner, the scene was as interesting as it was extraordinary. In consequence of the rapid rate at which we were travelling, the bags which were hanging from the thirty brass pegs on the sides of the office had a tremulous motion, which at every jerk of the train was changed for a moment or two into a slight rolling or pendulous movement, like towels, etc., hanging in a cabin at sea. While the guard's face, besides glistening with perspiration, was—from the labour of stooping and hauling at large letter-bags—as red as his scarlet coat, which was hanging before the wall on a little peg, until at last his cheeks appeared as if they were shining at the lamp immediately above them almost as ruddily

as the lamp shone upon them—the three clerks were actively moving their right hands in all directions, working vertically, with the same dexterity with which compositors in a printing-office horizontally restore their type into the various small compartments to which each letter belongs. Sometimes a clerk was seen to throw into various pigeon-holes a batch of mourning letters, all directed in the same handwriting, and evidently announcing some death; then one or two registered letters wrapped in green covers. For some time, another clerk was solely employed in stuffing into bags, newspapers for various destinations. Occasionally the guard, leaving his bags, was seen to poke his burly head out of a large window behind him into pitch darkness, enlivened by the occasional passage of bright sparks from the funnel-pipe of the engine, to ascertain, by the flashing of the lamps as he passed them, the precise moment of the train clearing certain stations, in order that he might record it in his "time-bill." Then, again, a strong smell of burning sealing-wax announced that he was sealing up, and stamping with the Post-office seal, bags, three or four of which he then firmly strapped together for delivery. All of a sudden, the flying chamber received a hard sharp blow, which resounded exactly as if a cannon-shot had gone through it. This noise, however, merely announced that a station-post we were at that moment passing, but which was already far behind us, had just been safely delivered of four leather letter-bags, which, on putting our head out of the window, we saw, quietly lying in the far end of a large, strong, iron-bound sort of landing-net, or

cradle, which the guard a few minutes before had, by a simple movement, lowered on purpose to receive them. But not only had we received four bags, but at the same moment, and apparently by the same blow, we had, as we flew by, dropped at the same station three bags, which a Post-office authority in waiting there had already carried away. The blow that the pendent bag of letters, moving at the rate say of forty miles an hour, receives in being suddenly snatched away, must be rather greater than that which the flying one receives on being suddenly, at that rate, dropped on the road. Both operations, however, are effected, by a projecting apparatus from the flying post-office coming suddenly into contact with one protruding from the post.

As fast as the clerks could fill the pigeon-holes before them, the letters were quickly taken therefrom, tied up into bundles, and then by the guard deposited into the leather bags to which they belonged. On very closely observing the clerks as they worked, we discovered that instead of sorting their letters into the pigeon-holes, according to their superscriptions, they placed them into compartments of their own arrangement, and which were only correctly labelled in their own minds; but as every clerk is held answerable for the accuracy of his assortment, he is very properly allowed to execute it in whatever way may be most convenient to his mind or hand.

Besides lame writing and awkward spelling, it was curious to observe what a quantity of irrelevant nonsense is superscribed upon many letters, as if the writer's ob-

ject was purposely to conceal from the sorting clerk the only fact he ever cares to ascertain, namely, *the post town*. Their patience and intelligence, however, are really beyond all praise; and although sometimes they stand for eight or ten seconds holding a letter close to their lamp, turning sometimes their head and then it, yet it rarely happens that they fail to decipher it. In opening one bag, a lady's pasteboard work-box appeared all in shivers. It had been packed in the thinnest description of whitey-brown paper. The clerk spent nearly two minutes in searching among the fragments for the direction, which he at last discovered in very pale ink, written apparently through a microscope with the point of a needle. The letters sorted in the flying post-office are, excepting a few "late letters," principally cross-post letters, which, although packed into one bag, are for various localities. For instance, at Stafford, the mail takes up a bag made up for Birmingham, Wolverhampton, and intermediate places; the letters for which, being intermixed, are sorted by the way, and left at the several stations.

The bags have also to be stowed away in compartments according to their respective destinations. One lot for Manchester, Liverpool, and Dublin; one for Chester; a bundle of bags for Newcastle-under-Lyne, Market-Drayton, Eccleshall, Stone, Crewe, Rhuabon; a quantity of empty bags to be filled coming back; a lot for Edinburgh, Glasgow, and Carlisle; and one great open sack contained all the letter-bags for Dublin taken upon the road.

The minute arrangements necessary for the transaction of all this important business at midnight, while the train is flying through the dark, it would be quite impossible to describe. The occupation is not only highly confidential, but it requires unceasing attention, exhausting to body and mind. Some time ago, while the three clerks, with their right elbows moving in all directions, were vigorously engaged in sorting their letters, and while the guard, with the light of his lamp shining on the gilt buttons and gold lace which emblazoned the pockets of his waistcoat, was busily sealing a letter-bag, a collision took place, which, besides killing four men, at the same moment chucked the sorting clerks from their pigeon-holes to the letter-bags in the guard's compartment. In due time the chief clerk recovered from the shock; but, what had happened—why he was lying on the letter-bags—why nobody was sorting—until he recovered from his stupor, he could not imagine!

CREWE.

We have now reached the most important station on the London and North-Western Railway; indeed the works here are on a scale which strikingly exemplifies the magnitude of the arrangements necessary for the maintenance of an arterial railway.

The Company's workshops at Crewe consist of a Locomotive and of a Coach department. In the manufactories of the former are constructed as well as repaired

the whole of the engines and tenders required for the Northern Division, namely, from Birmingham to Liverpool; Rugby to Stafford; Crewe to Holyhead; Liverpool to Manchester; Liverpool, Manchester, and Warrington to Preston; Preston to Carlisle. The total number of miles is at present three hundred and sixty, but the distance of course increases with the completion of every new branch line. In this division there are two hundred and twenty engines and tenders (each averaging in value nearly £2000), of which at least a hundred are at work every day. Besides repairing all these, the establishment has turned out a new engine and tender on every Monday morning since the 1st of January, 1848. The number of workmen employed in the above department is one thousand six hundred, their wages averaging £3800 a fortnight. The accounts of these expenses, as also a book of "casualties," in which every accident to, as well as every delay of, a train is reported, are examined once a fortnight by a special committee of directors.

Without attempting to detail the various establishments, we will briefly describe a few of their most interesting features.

Close to the entrance of the Locomotive Department stands as its *primum mobile*, the tall chimney of a steam-pump; which, besides supplying the engine that propels the machinery of the workshops, gives an abundance of water to the locomotives at the station, as also to the new railway town of Crewe, containing at present about eight thousand inhabitants. This pump lifts about

eighty or ninety thousand gallons of water per day from a brook below, into filtering beds, whence it is again raised about forty feet into a large cistern, where it is a second time filtered through charcoal for the supply of the town. On entering the great gate of the department, the office of which is up a small staircase on the left hand, the first object of attention is the great engine-stable into which the hot, dusty locomotives are conducted after their journeys, to be cleaned, examined, repaired, or, if sound, to be greased and otherwise prepared for their departure;—the last operation being to get up their steam, which is here effected by coal, instead of coke, in about two hours. After passing through a workshop containing thirty-four planing and slotting machines in busy but almost silent operation, we entered a smith's shop, two hundred and sixty feet long, containing forty forges all at work. At several of the anvils there were three and sometimes four strikers, and the quantity of sparks that more or less were exploding from each,—the number of sledge-hammers revolving in the air, with the sinewy frames, bare throats, and arms, of the fine pale men who wielded them, formed altogether a scene well worthy of a few moments' contemplation. As the heavy work of the department is principally executed in this shop, in which iron is first enlisted, and then rather roughly drilled into the service of the Company, it might be conceived that the music of the forty anvils at work would altogether be rather noisy in concert. The grave itself, however, could scarcely be more silent than this workshop, in com-

parison with the one that adjoins it, in which the boilers of the locomotives are constructed. As for asking questions of, or receiving explanations from the guide, who with motionless lips conducts the stranger through this chamber, such an effort would be utterly hopeless; for the deafening noise proceeding from the riveting of the bolts and plates of so many boilers is distracting beyond description. We almost fancied that the workmen must be aware of this effect upon a stranger, and that on seeing us enter they therefore welcomed our visit by a *charivari* sufficient to awaken the dead. As we hurried through the din we could not, however, help pausing for a moment before a boiler, of copper inside and iron outside, within which there sat crouched up—like a negro between the decks of a slave-ship—an intelligent-looking workman holding with both hands a hammer against a bolt, on the upper end of which, within a few inches of his ears, two lusty comrades on the outside were hammering with surprising strength and quickness. The noise which reverberated within this boiler, in addition to that which was resounding without, formed altogether a dose which it is astonishing the tympanum of the human ear can receive uninjured; at all events we could not help thinking, that if there should happen to exist on earth any man ungallant enough to complain of the occasional admonition of a female tongue, if he will only go by rail to Crewe, and sit in that boiler for half an hour, he will most surely never again complain of that "cricket on his hearth,"—the whispering curtain lectures of his *dulce domum*. The adjoining shop

contains a brass and also an iron foundry, in which were at work seven brass and five iron-moulders. In the corner of this room we stood for a few moments looking over the head and shoulders of a fine little boy, who was practically exemplifying the properties of the most wonderful of the mineral productions of nature—the loadstone. Among the mass brought into this work-shop to be re-cast are occasionally a quantity of brass shavings and sweepings, among which there is a small proportion of iron filings, etc. The little boy's occupation consisted in constantly stirring up the mass or mess before him with a magnet, which, as often as it came out bristling with resplendent particles of iron of various sizes, he swept clean, and then continued his work until the investigator came out of the heap as clear of iron as it went in. Close to this shop is one in which the models and patterns of the castings are constructed. From a spacious open yard covered with stacks of old scrap-iron, much of which was of the size of common buttons, a door opens into a large shop containing twelve forges solely used for the construction of engine-wheels, which are forced on as well as off their axles by an ingenious machine of extraordinary power. Adjoining the open yard we saw in operation Nasmyth's great steam-hammer, on the summit of which there sat perched up a man who could regulate its blow from, say twenty-five tons, to a little tap sufficient only to drive a common-sized nail. As soon as the furnace-door on one side of this hammer was opened, a large lump of scrap-iron at a white heat was lifted, and then conducted by

a crane on to the anvil beneath. At the same moment, from an opposite furnace, a long iron bar, heated only at one extremity, was by a gentle blow of the hammer no sooner welded to the mass, than the head smith, using it as a handle, turned, and re-turned the lump on the anvil so as to enable the steam-hammer to weld its contents into proper form. Of course there has been selected for this extremely heavy work, the strongest man that could be obtained. He is of about the height and bulk of the celebrated Italian singer, Signor Lablache, with apparently the strength of Hercules, or rather of Vulcan himself,—and certainly nothing could be a finer display of muscular power than the various attitudes which this heavy man assumed, as, regardless of the sparks which flew at him, or of the white heat of the lump of iron he was forging, he turned it on one side and then on the other, until at a given signal, a small smith in attendance placed a sort of heavy chisel on the iron handle, which, by a single blow of the hammer, was at once severed from it, in order that it might be piled away, and another mass lifted from the fiery furnace to the anvil.

Close to this Cyclopean scene there is a shop solely for turning wheels and axles, which, brought here rough from the smiths' forges we have described, never leave this place until they are ready to go under the engine for which they have been made.

After passing through a grinding-shop and a coppersmith's shop, which we must leave without comment, we entered a most important and interesting hall, 330

feet in length by sixty feet in breadth, termed "the fitting-shop," because the work brought here in various states is all finally finished and fitted for its object. Besides eleven planing-machines, thirty-six shaping and slotting-machines, and thirty turning-lathes, all working by steam-power, we observed, running nearly the whole length of the building, five sets of tables, at which were busily employed in filing, rasping, hammering, etc., eight rows of "*vice-men*," so called because they work at vices. The whole of the artificers in this room are of the best description, and the importance of their duties cannot perhaps be more briefly illustrated than by the simple fact that, besides all the requisite repairs of 200 locomotive engines, they were employed in finishing the innumerable details of thirty new ones in progress. Some were solely engaged in converting bolts into screws; some in fitting nuts; some in constructing brass whistles: in short, in this division of labour almost every "vice-man" was employed in finishing some limb, joint, or other component part of a locomotive engine destined to draw trains of either goods or passengers.

After visiting a large storeroom, in which all things appertaining to engines, sorted and piled in innumerable compartments, are guarded by a storekeeper, who registers in a book each item that he receives and delivers, we will now introduce our readers to the climax of the establishment, commonly called "*the Erecting-shop*." Hitherto we have been occupied in following in tedious detail from the foundry to the forge, and from the anvil to the vice, the various items, such as

plates, rivets, bolts, nuts, rings, stays, tubes, ferrules, steam-pipes, exhausting-pipes, chimney-pipes, safety-valves, life-guards, axle-boxes, pistons, cylinders, connecting-rods, splashers, leading and trailing-wheels, etc., amounting in number to 5416 pieces, of which a locomotive engine is composed. We have at last, however, reached that portion of the establishment in which all those joints, limbs, and boilers, which have been separately forged, shaped, and finished in different localities, are assembled together for the consummation of the especial object for which, with so much labour and at so great an expense, they have been prepared: indeed nothing, we believe, can be more true than Mr. Robert Stephenson's well-known maxim—"*A locomotive engine must be put together as carefully as a watch!*"

The Erecting-shop at Crewe is a room 300 feet long by 100 feet broad, containing five sets of rails, upon three of which are erected the new engines and tenders—the other two being usually occupied by those under heavy repair. The number of artificers we found employed was 220. In this magnificent building we saw in progress of erection twenty passenger-engines, also ten luggage-engines; and as this shop has (as we have before stated) turned out a locomotive engine and tender complete, on every Monday morning, for very nearly a year, and is continuing to supply them at the same rate, we had before us in review locomotive engines in almost every stage of progress; and when we reflected on the innumerable benefits, and even blessings, which resulted to mankind from their power, it was most pleasing to be

enabled at one view to see—as it were in rehearsal behind the scenes—performers who were so shortly to appear upon the stage of life.

At the further end of the line of rails, close to the north wall, there appeared a long, low, tortuous mass of black ironwork, without superstructure or wheels, in which the form of an engine-bed in embryo could but very faintly be traced; a little nearer was a similar mass, in which the outline appeared to be more distinctly marked; nearer still the same outline appeared upon wheels; to the next there had been added a boiler and fire-box, without dome, steam-escape, or funnel-pipe; nearer still the locomotive engine in its naked state appeared, in point of form, complete:—and workmen were here busily engaged in covering the boiler with a garment about half an inch thick of hair-felt, upon which others were affixing a covering of inch deal-plank, over which was to be tightly bound a tarpaulin, the whole to be secured by iron hoops. In the next case the dome of the engine was undergoing a similar toilette, excepting that, instead of a wooden upper garment, it was receiving one of copper. Lastly—(it was on a Saturday that we chanced to visit the establishment)—there stood at the head of this list of recruits a splendid bran-new locomotive engine, completely finished, painted bright green—the varnish was scarcely dry—and in every respect perfectly ready to be delivered over on Monday morning to run its gigantic course. On other rails within the building were tenders in similar states of progress; and, as the eye rapidly glanced down these

iron rails, the finished engine and tender immediately before it seemed gradually and almost imperceptibly to dissolve, in proportion to its distance, until nothing was left of each but an indistinct and almost unintelligible, dreamy vision of black ironwork. On one of the furthest rails, among a number of engines that were undergoing serious operations, we observed "*The Colonel,*" which, by going off the rails at Newton Bridge, caused the death of General Baird.

COACH DEPARTMENT.

As our readers will no doubt feel some little selfish interest in the construction of the railway-carriages in which they travel, we shall conclude our rapid survey of the Company's workshops at Crewe by a short inspection of the coach establishment. This department constructs and maintains for the traffic on 393 miles of rails all the requisite passenger-carriages, luggage-vans, travelling-post-offices and tenders, parcel-vans and parcel-carts, milk-trucks (principally to supply Liverpool), and break-waggons.

At the Company's "Waggon Department" at Manchester—which is about to be transferred to Liverpool—are constructed and maintained all the requisite goods-waggons, horse-boxes, coke-waggons, carriage-trucks for private carriages, cattle-waggons and timber-trucks.

The total number of carriages of all descriptions maintained at Crewe amounts to 670, of which about 100 at a time are usually in hospital. There are generally

from thirty to forty new carriages in progress: the number of workmen employed was 260. The establishment is divided into one set of workshops for the construction, and another for the repair of carriages.

1. In a large shop, 300 feet in length, warmed by steam, at night lighted by gas, and by day from lofty windows on each side, there is throughout the whole length of the building a wooden pavement containing eight sets of rails, upon which we beheld, like hackney-coaches on their stands, a variety of carriages in various stages of construction and of alteration, each surrounded by several intelligent artificers, who, instead of throwing away their time in dancing round a tree of liberty, to the tune, or, as it is poetically termed by M. Lamartine, "the dogma" of liberty, fraternity, and *equality*, were sedulously occupied in framing *different* sorts of carriages to suit the various gradations of human society. For instance, one set, with beautiful colours, were painting the outside of a "first-class;" while their comrades within were padding it, and petting it, and stuffing it, as if its object were to fit every bend and hollow in the human frame. Another set were strongly varnishing the wooden oak-painted interior of a "second-class," whose exterior had evidently received considerable attention; while another gang were "finishing off" a covered "third-class," whose inside certainly appeared not only very hard, but what month-nurses term "terribly troubled with wind."

In another quarter, a set of workmen were economically turning an old first-class into a second-class—the

transmutation being effected by taking out the lining, and then converting large, fashionable, oval windows into little vulgar square ones. But though comfort, like cheese, bacon, or any other description of merchandise, was thus doled out to each class of passengers according to the amount of it which they might desire to purchase, the *materials* of all the carriages appeared to be of good sound quality. The panels of first, second, and third-class carriages, as well as those even of luggage-vans, are invariably made of mahogany; "the bottom-sides" of English oak; the rest of the framing of ash. The break-blocks are made of willow, and usually last about ten weeks' work. Adjoining this congregation of carriages is a smith's shop, containing twenty-eight forges and a tire-oven; above which we found a large store-room filled with lace-trimming, horse-hair, superfine cloth, varnished oil-cloth, nails, rugs, and, among a variety of other requirements, plate-glass for windows. We observed that those for the front glasses of *coupés*—in order to enable them to resist the occasional pelting of hot cinders from the engine—were half an inch thick! There was also, in an adjoining store, a collection of old cushions, mercilessly indented and worn out by a description of dull heavy pressure, which need not be described.

2. The *Hospital* of the Coach Department at Crewe is an enormous shed, 600 feet long by 180 broad. It is capable of holding ninety carriages, with ample room for working around them, but only eighty were under repair. Among them we observed several flying post-

offices and tenders bearing the Royal arms. Adjoining is a large smith's shop; also a spacious yard containing a heavy stock of timber piled under sheds, with an office for recording the daily amount received and delivered. On entering "*the Grease House,*" which, contrary to expectation, we found to be as clean as a dairy, we perceived, standing against the walls, three huge casks of Russian tallow, a quantity of yellow palm-oil, several boxes of soda, and a water-cock. On the opposite side stood a small steam-boiler for heating two open caldrons and two wooden cooling-vats. This apparatus is constructed for the fabrication of that yellow mixture which our readers have seen bestowed so generously to the axles of the carriages of every train. We had often in vain endeavoured to ascertain its composition, which, from "*the grease-master,*" the highest possible authority on the subject, we at last discovered to be as follows:—

200 lbs. of Russian tallow.	20 lbs. of soda.
70 lbs. of palm-oil.	50 gallons of water.

Besides heating the two caldrons we have mentioned, large iron pipes pass from the steam-boiler to the immediate vicinity of two casks, each containing one ton of sperm-oil, which is thus kept constantly fluid, instead of crystallizing, as it is prone to do, during cold weather.

A RAILWAY TOWN.

Having now concluded our rough sketch of the workshops of the Locomotive and Coach Departments at Crewe,—in both of which the Company's artificers and

workmen toil both winter and summer from six in the morning till half-past five in the evening, excepting on Saturdays, when they leave off at four,—our readers will, we hope, feel sufficiently interested in their welfare to inquire, as we anxiously did, a little into their domestic history and comforts. About a hundred yards from the two establishments we have just left, there stands a plain neat building, erected by the Company, containing baths,—hot, cold, and shower,—for the workmen, as well as for their wives and daughters; the hours allotted for each sex being stated on a board, which bluntly enough explains that the women may wash while the men are working, and *vice versâ*. For this wholesome luxury the charge for each person is 1½*d*.; and although we do not just at present recollect the exact price of yellow soap per bar, of sharp white sand per bushel, of stout dowlas-towelling per yard, or the cost of warming a few hundred gallons of water, yet, as we stood gazing into one of these baths, we could not help thinking that, if that Hercules who works the steam-hammer can, on Saturday night after his week's toil, be scrubbed perfectly clean and white for three-halfpence, he can have no very great reason to complain; for surely, except by machinery, the operation could scarcely be effected much cheaper! To a medical man the Company gives a house and a surgery, in addition to which he receives from every unmarried workman 1*d*. per week; if married, but with no family, 1½*d*. per week; if married, and with a family, 2*d*. per week; for which he undertakes to give attendance and medicine to whatever men, women,

children, or babies of the establishment may require them. A clergyman, with an adequate salary from the Company, superintends three large day-schools for about 300 boys, girls, and infants. There is also a library and mechanics' institute, supported by a subscription of 10*s*. a year, at which a number of very respectable artificers, whose education when young was neglected, attend at night to learn, *ab initio*, reading, writing, and arithmetic. There is likewise a vocal and instrumental class, attended by a number of workmen, with their wives and daughters.

The town of Crewe contains 514 houses, one church, three schools, and one town-hall, all belonging to the Company; and as the birth, growth, and progress of a railway town is of novel interest, our readers will, we think, be anxious to learn at what speed our railway stations are now turning into towns, just as many of our ancient post-houses formerly grew into post-towns. Although the new houses at Crewe were originally built solely for railway servants, yet it was soon found necessary to construct a considerable number for the many shopkeepers and others who were desirous to join the new settlement; and accordingly, of the present population of 8000, about one-half are strangers. Not only are the streets, which are well lighted by gas, much broader than those of Wolverton, but the houses are, generally speaking, of a superior description; and, although all are new, yet it is curious to observe how insidiously old customs, old fashions, old wants, and even old luxuries, have become domiciled. Many of the shops

have large windows, which eagerly attempt to look like plate-glass. In the shoemakers' shops, contrasted with thick railway boots and broad railway shoes, hang narrow-soled Wellingtons and Bluchers, as usual scarcely half the gauge or breadth of the human foot. The Company's workmen began by having a cheap stout dancing-master of their own; but, the aristocracy of Crewe very naturally requiring higher kicks, we found a superior and more elegant artist giving lessons in the Town-hall, a splendid room capable of containing 1000 persons.

It would of course be quite irregular for 8000 persons to live together without the luxury of being enabled occasionally to bite and tickle each other with the sharp teeth and talons of the law, and accordingly we observed, appropriately inscribed in large letters on the door of a very respectable-looking house,

GRIFFIN, ATTORNEY.

Mankind are so prone to draw distinctions where no real differences exist, that among our readers there are probably many who conceive that although they themselves are fully competent to enjoy Fanny Kemble's readings from Shakspeare, such a mental luxury would be altogether out of character at *New Crewe!* In short, that shops full of smiths and other varieties of workmen (particularly him of the steam-hammer, and most especially the artificer we saw squatted in the noisy boiler), although all exceedingly useful in their ways, could not possibly appreciate the delicate intonations of voice, or the poetical beauties, to which we have alluded. Now, without the smallest desire to oppose this theory, we

will simply state, that while, during the men's dinner-hour, we were strolling through the streets of Crewe, we observed on the walls of a temporary theatre, surrounded by a crowd of gaping mouths and eager unwashed faces, a very large placard, of which the following is a copy:—

BY PARTICULAR DESIRE.

MR. JONES WILL REPEAT

The Scene from Macbeth and Cato's Soliloquy:

LIKEWISE

Imitations of Charles Kemble, Edmund Kean, and Mr. Cooper.

The town and shops of Crewe are well lighted by gas from the Company's works, which create about 30,000 cubic feet per day—the foot-paths of the streets being of asphalt, composed of the Company's coal-tar mixed up with gravel and ashes from the workshops. The town is governed by a Council of fifteen members, two-thirds of whom are nominated by the workmen and inhabitants, and one-third by the directors. Their regulations are all duly promulgated "by order of the Council."

To conclude.—Although our limits do not allow us to enter into many statistical details, we may mention that the number of persons employed on account of the London and North-Western Railway Company, inclu-

ding those occupied in the collection and delivery of goods, is as follows:—

2	Secretaries.
1	Manager.
2	Superintendents.
966	Clerks.
3054	Porters.
701	Police-constables.
738	Engine and Firemen.
3347	Artificers.
1452	Labourers.
Total number 10,263	

The number of horses employed is	612
Ditto vans, etc.	253

MORAL.

The few sketches which we have now concluded, minute and trivial as they may appear in detail, form altogether a mass of circumstantial evidence demonstrating the vast difficulty, as well as the magnitude, of the arrangements necessary for the practical working of great railways; and yet we regret to add, in their general management there exist moral and political difficulties more perplexing than those which science has overcome, or which order has arranged. We allude to a variety of interests, falsely supposed to be conflicting, which it is our desire to conciliate, and respecting which we shall endeavour to derive an honest moral.

When the present system of railway travelling was about to be introduced into Europe, it of course became

necessary for Parliament, and for His Majesty's Government, seriously to consider, and eventually to determine, whether these great national thoroughfares should be scientifically formed, regulated, and directed by the State, under a board competently organized for the purpose (see Volume I., p. 218), or whether the conveyance of the public should be committed to the inexperienced and self-interested management of an infinite number of joint-stock companies. Without referring to bygone arguments in favour of each of these two systems, and, above all, without offering a word against the decision of Parliament on the subject, we have simply to state that the joint-stock system was adopted, and that, accordingly, capitalists and speculators of all descriptions—men of substance and men of straw—were authorized, at their own cost, to create and govern the iron thoroughfares of the greatest commercial country in the world. The first result was what might naturally have been expected, for no sooner was it ascertained that a railway connecting, or as it may be more properly termed, tapping immense masses of population, such, for instance, as are contained in London, Bristol, Birmingham, Liverpool, Manchester, etc., was productive of profit, than just as when one lucky man finds a rich lode, hundreds of ignorant, foolish people immediately embark, or, as it is too truly termed, *sink* their capital in "*mining*," so it was generally believed that *any* "railway"—whether it connected cities or villages, it mattered not a straw—would be equally productive.

The competition thus first irrationally and then insanely created was productive of good and evil. The

undertakings were commenced with great vigour. On the other hand, as engineering talent cannot be produced all of a sudden as easily as capital, many important works were constructed under very imperfect superintendence; and as iron, timber, and every article necessary for the construction of a railway, simultaneously rose in value, the result was that the expense of these new thoroughfares, which by the exaction of fares proportionate to their outlay must, of course, eventually be paid for by the public, very greatly exceeded what, under a calm, well-regulated system, would have been their cost. Nevertheless, in spite of all difficulties and expenses, foreseen as well as unforeseen, our great arterial railways were very rapidly constructed.

The Managers however had scarcely concluded their "song of triumph," when they found themselves seriously embarrassed by a demand on the part of the public for what has been rather indefinitely termed "cheap travelling;" and as this question involves most serious considerations, we will offer a very few observations on it.

There can be no doubt that inasmuch as it is the duty of Parliament to legislate for the interests of the public, so it is the duty of Her Majesty's Government to exercise their influence in legitimately obtaining for the community *cheap* travelling. But although money is valuable to every man, his life is infinitely more precious; and therefore without stopping to inquire whether by cheap travelling is meant travelling for nothing, for fares unremunerative, or for fares only slightly remunerative to the Company, we submit as a mere point of

precedence, that the *first* object the Legislature ought to obtain is, that every possible precaution shall be taken to ensure for the public SAFE travelling.

Now, casting aside all petty or local interests, we calmly ask, in what manner and by what means would Her Majesty's Government ensure for the public safe travelling, supposing our railways were the sole property of the State?

The answer is not only evident, but, we submit, undeniable.

The way, under Providence, to protect the public from avoidable accidents on railways is, utterly regardless of expense, to construct the rails, sleepers, locomotive-engines, and carriages, of the very best materials, carefully put together by the best workmen; and then to entrust the maintenance of the line to engineers and other men of science of the highest attainments, assisted by a corps of able-bodied guards, pointsmen, and policemen, all sober, vigilant, active, intelligent, and honest.

Now it is highly satisfactory to reflect that every one of the above costly precautions, as well as all others of a similar nature which a paternal Government could reasonably desire to enforce, are as conducive to the interests of the proprietors of a railway as they are to the safety of those who travel on it; for even supposing that the Directors take no pride in maintaining the character of the national thoroughfare committed to their charge, —that, reckless of human life, they care for nothing but their own pockets,—a railway accident summarily inflicts upon their purses the same description of punishment

instantaneously awarded to a man who carelessly runs his head against a post. For instance, only a few weeks ago a ballast-train on the London and North-Western Railway having stopped for a moment, a goods-train behind it ran into it. No one was hurt excepting the Company, who suffered a loss of £4000 by the collision. Independent, therefore, of the heavy damages readily awarded by juries to any one hurt by a railway accident, the injuries self-inflicted by the Company on their own costly engines, carriages, etc., are most serious in amount, to say nothing of the almost incalculable embarrassment they may create: indeed, taking into fair consideration the costly results which have occurred to our Railway Companies by the dislocation of a bolt, the unscrewing of a little nut, or from a variety of other causes equally trifling, it may, we believe, be truly said that the punishment which Railway Companies have received from accidents have, generally speaking, exceeded rather than fallen short of their offences; and thus every intelligent Board of Directors is aware that *safety* in travelling is more emphatically for the interest of railway proprietors than any other consideration whatever: in short, that there is nothing more expensive to a Railway Company than an accident.

It being evident therefore that it is as much for the interests of railway proprietors as of railway travellers that every possible precaution should be taken by the Company to prevent accidents, we have now to observe that to attain all the necessary securities there is but one thing needful, namely MONEY. With it Her Ma-

jesty's Government might conscientiously undertake the serious responsibility of prescribing all that science could administer for the safety of the public. Without money, what Government or what individual who had any character to lose could for a moment undertake that which his judgment would clearly admonish him to be utterly impracticable? Now, if this reasoning be correct, the managers of our arterial railways were certainly justified in expecting that, if the Government required them to take every possible precaution to ensure *safe* travelling, they would, as a matter of course, assist them in obtaining the same means which they themselves would require had they to effect the same object, namely MONEY. But instead of endeavouring to obtain for Railway Companies these means; or rather, instead of enabling them to retain the means which under their respective Acts of Parliament they already legally possessed of purchasing security for the public, Parliament, in compliance with a popular outcry for *cheap* travelling, deemed it advisable to require from railways a reduction of the tolls necessary to ensure SAFE travelling. And yet, to any one who will carefully observe the practical working of a railway, it is not only alarming, but appalling, to reflect on the accidents which sooner or later *must* befall the public if the master-mind which directs the whole concern, but which cannot possibly illuminate the darkness of every one of its details, is to be suddenly deprived of the talisman by which alone he can govern a lineal territory four or five hundred miles in length; namely, an abundant supply of MONEY. Parliament may thunder—Government may

threaten—juries may punish—the public may rave; but if the fustian-clad workmen who put together the 5416 pieces of which a locomotive engine is composed are insufficiently paid—if the wages of the pointsmen, engine-men, and police be reduced to that of common labourers—if cheap materials are connected together by scamped workmanship,—the black eyes, bloody noses, fractured limbs, mangled corpses of the public, will emphatically proclaim, as clearly as the hopper of a mill, the emptiness of the exchequer. So long as the manager of a railway has ample funds, he ought to be prepared, regardless of expense, to repair, with the utmost possible despatch, the the falling-in of a tunnel, or any other serious accident to the works—in short, the whole powers of his mind should be directed to the paramount interests of the public, which, in fact, are identical with those of the Company. But, if an able manager has no funds,—or, what is infinitely more alarming, in case, from want of funds, the impoverished proprietors of the railway shall have angrily elected, in his stead, the representative of an ignorant, ruinous, and narrow-minded policy,—how loudly would the public complain,—how severely would our commercial interests suffer, if, on the occurrence to the works of any of the serious accidents to which we have alluded, the new Ruler were to be afraid even to commence any repairs until he should have been duly authorized by his newly-elected economical colleagues to haggle and extract, from a number of contractors, the cheapest tender!

But we fear it would not be difficult to show that, in

reducing the established rates of our great railways before their works were completed, Parliament has unintentionally legislated upon erroneous principles. For instance, we have already explained that the profit of a railway depends upon the amount of the population, and goods, which flow upon it from the towns it taps. If, therefore, the traffic on an arterial line be but moderately remunerative, it must be evident that a branch line must be an unprofitable concern—unless, indeed, the company be authorized to levy upon it *higher* tolls than are sufficient on the trunk line. When, therefore, in the rapid development of our great national railway system it was found necessary, for the accommodation of a fraction of the public, to apply to Parliament for powers to make these unremunerating branch-lines, the companies were certainly in theory entitled to expect the extra assistance we have explained;—instead of which they were practically informed that, unless they would consent to LOWER their tolls altogether, they would not be allowed to develope their system by the construction of any branch-line; which is as if a tenant were to say to his landlord—"If you incur the expense of making convenient bye-roads to my farm, to enable me, with facility, to take my crops to market, *you must lower my rent.*"

As it is undeniable that exorbitant rates, besides being inconvenient to the public, are highly injurious to the real interests of railway proprietors—indeed, we have shown how enormously the traffic of the country has been increased by low charges—we are fully disposed, not only most strongly to recommend, but as far as it may be legal

to enforce, that salutary principle; but the insuperable difficulty of, *at present*, adjusting the proper tolls to be levied on the public is, that no arterial railway in Great Britain can either declare in figures, or even verbally explain, the real state of its ultimate expenditure and receipts, for the sole reason, namely, that the enterprise is not yet worked out, and that no man breathing can foretell what are to be its limits.

What has become, we ask, of the *old* London and Birmingham Railway (born only in 1836)—of the Grand Junction Railway—of the Manchester and Birmingham—the Liverpool and Manchester Railways—and of a score of others we could name? What has become of the civil, or rather uncivil, war which all these companies waged against each other; as well as against Messrs. Pickford, the most powerful carriers in the world? They have all lost the independence they respectively occupied, and, like the ingredients cast by Macbeth's witches "i' th' charmed pot," they have "boiled," or, as it is nowadays termed, amalgamated, into one great stock; and while this long, continuous, arterial line has been drawing from the public for goods and passenger traffic considerable receipts, it has been, and at various localities still is, draining its own life-blood by the forced construction of a number of sucking lines, which, as far as we can see, are not likely ever to be remunerative, and thus, the trunk will, ere long, be eaten up by its own branches.

For some time Railway Companies deemed it their interest to compete against each other, but this ruinous system was gradually abandoned, and is now reversed.

The two lines from London to Peterborough, after competing for several months, now divide their profits. The two lines to Edinburgh will probably ere long do the same. But besides this transmutation of competition into combination, public notice has been lately given that three of the large arterial lines, namely, the Great Western, the South-Western, and the London and North-Western, were meditating an amalgamation of their respective stocks into one vast concern. On this important project, which for the present has been abandoned, we will offer a very few observations.

We believe it may be affirmed, without fear of contradiction, that the working details of a railway are invariably well executed in proportion to their magnitude: for instance, in the management of the London and North-Western Railway the arrival and departure of trains are better regulated at their large stations than at their small;—their great manufactories are better and more economically conducted than their little ones;—the arrangements of Messrs. Pickford and of Messrs. Chaplin and Horne are better at Camden Town than at the small outlying stations;—in short, we most distinctly observed that wherever there was an enormous amount of important business to be transacted, *there* were invariably to be found assembled superior talents, superior workmen, superior materials; and, on the other hand, at small and secluded localities, where little work was performed, we found that inferior men, inferior waggons, horses, etc., were employed.

In the old system of travelling it was safer to drive

through crowded streets than along a lonely road; old horses as well as old drivers were deemed safer than young ones; in fact, the more the traveller was impeded, the less dangerous was his journey. But on our railways, when once a man has tied himself to the tail of a locomotive engine, it matters but little, especially in a fog, whether he flies at the pace of fifty miles an hour, or whether he crawls, as it is now termed, at the rate only of twenty; for, in either case, if there be anything faulty in the works, machinery, or management, accidents which it is fearful to contemplate may cause his sudden death. Considering, therefore, that not only the ability necessary for the general management of a railway, but the intelligence and vigilance requisite at every station and on every portion of the line are found practically to increase according to the demand, and *vice versâ*, it is evident that nothing would prove more fatal to the public, as well as ruinous to proprietors, than to split an efficient remunerating great railway into two or more inefficient and unremunerating small ones. A little railway, like "a little war," is murderous to those engaged in it,—ruinous to those who pay for it; and we are therefore of opinion that it is for the interest of the public not only that traffic should be concentrated as much as possible on large lines, rich enough to purchase management, engineering, servants, and materials of the very best description, but that these great lines, by uniting together, should voluntarily force themselves to exchange all paltry considerations, mean exactions, and petty projects, for those great principles which alone

should guide the administration of a *national system* of railways. There can be no doubt that any description of monopoly is abstractedly an evil, but if it be equally true that every inch of railway throughout the country represents an integral portion of a vast legally constituted monopolizing system, the practical question to consider is, not whether monopoly is an evil, but whether, of two evils, it will be more or less convenient for Parliament and the public to deal with *one* monopoly than with *many*;—whether, for instance, it would be more or less easy for Government in recommending alterations of fares, etc., to correspond solely with the Directors of the London and North-Western Railway than to communicate *seriatim* with the boards of the several Companies to whom the present line originally belonged, each of which might possibly, in opposition to each other, be pursuing a different course of policy.

As the new system has created an enormous increase of traffic, so it has, also, *pari passu*, developed talent proportionate to the extraordinary demand for it; and, therefore, whatever may be the imaginary dangers from a concentrated administration of our railways, we feel confident that the public have much greater reason to apprehend the inconveniences, to say the least, that must inevitably result to them from those sudden unreasonable changes of management, or rather of *mis*management, which are sure periodically to take place so long as every separate railway monopoly arbitrarily pursues not only its own system, but that which its restless shareholders from time to time may think proper to ordain. At all

events, until the best plan of managing our great railways shall have been finally ascertained, and most especially until the unknown liabilities, expenses, and receipts attendant upon the establishment over the surface of our country of a series of iron highways shall have been accurately developed, it must be utterly impossible for any practical man to decide to what extent, if any, the Parliamentary tolls originally levied on the public ought in equity to have been reduced.

The great truth, however, sooner or later, must appear; and as the hurricane, however violently it may blow, in due time is invariably succeeded by a breathless calm;—as the ocean waves, although mountain high, shortly subside;—as the darkest night in a few hours turns into bright daylight;—so must the present mystified prospects of our great railways inevitably ere long become clear and transparent as those of any other mercantile firm; and when this moment shall have arrived, we believe a very short time will elapse before Parliament, the amalgamated Railway Boards, and the public, will come to a creditable and amicable adjustment; for while, on the one hand, it can never be the interest of the public to prefer *cheap* to SAFE travelling, so it can never be the serious and fixed purpose of any body of men competent to direct the affairs of our arterial railways to exact from the public an exorbitant dividend which must inevitably create condign punishment; for so sure as water finds its own level will British capital always be forthcoming to lower by legitimate competition anything like a continued usurious exaction from the public. But

a moment's consideration of the following facts will show that as regards railway tolls the public have as yet no very great reason to complain.

In 'Herapath's Railway Journal' of the 30th of September last it appears that the capital expended on railways now open for traffic, amounting to £148,400,000, gives a profit of 1·81 per cent. for the half-year, or £3. 12*s*. 4⅘*d*. per cent. per annum. Deducting the non-paying dividend lines, the dividend on the remainder amounts to 2·09 per cent. for the half-year, or £4. 3*s*. 7⅓*d*. per cent. per annum.

And yet, after ten years' competition with railways the dividends received by the *Canal* Companies between London and Manchester were in 1846 as follows:—

	Per Cent.
Grand Junction Canal	6
Oxford	26
Coventry	25
Old Birmingham	16
Trent and Mersey	30
Duke of Bridgewater's (private property) say	30

The dividends received by the Grand Junction Canal for the last forty years have averaged £9. 10*s*. 9*d*. per cent. per annum.

Great as have been and still are the advantages to the country of our inland navigation, it cannot be denied that the creation of railways was a more hazardous undertaking than the construction of canals. Without however, offering any opinion as to the relative profits which it has been the fortune of the proprietors of each

of these valuable undertakings to divide, we merely repeat that, considering the unknown difficulties which for some time must continue to obscure the future prospects of our railways, it is neither for their interest nor for that of the public that the managers of these great national works should in the meanwhile be cramped by want of means in the development of the important system which it has pleased the Imperial Parliament to commit to *their* hands instead of to the paternal management of her Majesty's Government.

If the present alarming depreciation of railway property continue, it is evident that decisive measures, good, bad, or indifferent, will be deemed necessary by the shareholders to prevent if possible further loss; and while, on the one hand, the public ought not to be alarmed at impracticable threats, it is only prudence to consider what will probably be the lamentable results of a civil, or rather of an uncivilized warfare, between the travelling public and the proprietors of the rails on which they travel. In case the present forcibly reduced by Parliament fares should prove to be unremunerative, we have endeavoured to show that, unless the shareholders in anger elect incompetent managers, the public have no reason to entertain any extra apprehension from accidents;—for the engine-driver might as well desire to run his locomotive over an embankment as a company of proprietors—almost all of whom are railway travellers—become reckless of their property as well as of their lives. Indeed, if railway rates were to be further reduced to-morrow, the public would, we believe, travel as safely,

and perhaps even more so, than at present. The result of inadequate rates is not necessarily danger, but inconvenience, amounting to deprivation of many of those advantages which the railway system is calculated to bestow upon the country. For instance, to every practical engineer it is well known that pace is just as expensive on rails as on the road. At present the public travel fast, and those who want to go long distances are accommodated with trains that seldom stop. If, however, it does not suit the public to pay for *speed*, they cannot reasonably expect to have it. If railway companies as well as the public, are forced to economize, both, we believe, will eventually be heavy losers by the transaction. The London and North-Western Company, by taking off their express trains, might at once save upwards of £40,000 a year, besides severe extra damage to their rails. The railways in general might reduce the number of their trains,—make them stop at every little station,—run very slow,—suppress the delivery of day-tickets,—curtail the expenses of their station accommodation,—and finally almost abandon a number of tributary lines upon which large sums of money have been expended. It must therefore be for the public to determine whether, for the sake of a small saving in their fares, which after all are moderate as compared with other travelling charges, they desire not only to forego the accommodation and convenience to which they have lately become accustomed, but to arrest the development of the railway system to its utmost extent, and with its development its profits.

But, whether our railways be eventually governed by high-minded or by narrow-minded principles,—by one well-constituted amalgamated board, or by a series of small disjointed local authorities,—we trust our readers of all politics will cordially join with us in a prayer not unappropriate to the commencement of a new year, that the wonderful discovery which it has pleased the Almighty to impart to us, instead of becoming among us a subject of angry dispute, may in every region of the globe bring the human family into friendly communion; that it may dispel national prejudices, assuage animosities; in short, that by creating one common feeling of universal gratitude to the Power from which it has proceeded, it may produce on earth peace and goodwill towards men.

THE ELECTRIC TELEGRAPH.*

In strolling down Lothbury, in the City of London, the stranger suddenly sees, opposite to the dull dead wall of the Bank of England and pointing down an alley, the forefinger of a little black hand, under which are written the following words:—

"To the Central Telegraph Station."

And accordingly, at the bottom of the small *cul-de-sac* there it stands, appropriately designated by its "Electric Clock."

On entering the door of this establishment the visitor suddenly finds himself in a very handsome reception-hall, 53 feet long, 32 broad, and 45 feet high, illuminated from above by a skylight, which also gives light to three galleries, one above another, communicating with the various departments of the establishment.

Across this reception-hall, on the left of which are the secretary's and accountant's offices, there is at each side a long counter or table, that on the right being

* From Murray's Home and Colonial Library.

divided by green curtains into six desks, at which are to be seen the round, stout, slight, slim backs of persons of all shapes, and occasionally of both sexes, intently occupied in writing—unseen by each other—the important communications they are severally desirous to despatch. These messages are required to be written on a half-sheet of large-sized letter-paper, nearly one half of which is preoccupied by a printed form, to be filled up by the name and address of the writer, as also of the person to whom his communication is addressed; the charge of the message, answer, porterage, or cab-hire; the date and hour at which the message is received; and lastly, the date and hour at which the operation of conveying it was commenced and finished by the official who works the electric instrument.

On glancing at these forms our first impression was that the space allotted for the letter or message was insufficient. It is, however, practically found that the Company's charges, which amount, from, say London—

To Birmingham or Stafford . . .	$3\frac{9}{10}$d.	per word.
„ Derby, Norwich, Nottingham, or Yarmouth	$4\frac{1}{5}$	„
„ Liverpool, Leeds, Manchester .	$5\frac{1}{10}$	„
„ York	$5\frac{2}{5}$	„
„ Edinburgh	$7\frac{1}{5}$	„
„ Glasgow	$8\frac{1}{5}$	„

seriously admonish writers of all descriptions to be as brief as possible; indeed it is a very curious fact in natural philosophy that a lawyer, under the Company's galvanic influence, is suddenly gifted with a description of

clairvoyance which enables him to write on any subject in a laconic style, which in his chambers he would consider, and would most conscientiously assure his client, to be utterly impracticable!

As fast as these messages are written, they are, one after another, passed through a glass window to a small compartment, or rather department, on the ground-floor, termed "*the Booking-office;*" where, after having been briefly noted and marked with their distinctive numbers, they are by the same hand put into a small box, a bell is then rung, and at the same instant up they fly, through a sort of wooden chimney, to the attic regions of the building, to "*the Instrument Department;*" and as we slowly followed them by a staircase on every landing-place of which we involuntarily paused for a moment or two to reflect on the wonderful process we were about to witness, we own it was with admiration and surprise that, on entering the attic, we suddenly saw before us the simple materials with which such astonishing effects are produced.

In most of our manufactories it may but too truly be said that "the workmanship exceeds the materials." Before a common coffin-nail can be made, the bowels of the earth must be ransacked; ores raised in Cornwall must be smelted in Wales by coals which have been excavated, raised, carted, recarted, etc. The amount of labour which has been expended in the fabrication of every trifling commodity exhibited in our shops is in a similar manner almost incalculable: indeed, if our country-women did but know how many hours of unwholesome

and unremitting application have been required, nay, how many constitutions have been ruined, in the fabrication of the light, beautiful dresses and trinkets that adorn their persons, they would surely feel that their dance, delightful as it may have appeared to *them*, has been that of death to many of the poorest of their sex. Even the tedious details in the preceding essay prove that, while the public are luxuriously flying along the rails of only one arterial railway, an army of upwards of ten thousand workmen are labouring in a variety of attitudes for the management, protection, and maintenance of the way; and as we were not insensible of the usual necessity for these details, we certainly did expect to find that a proportionate amount of labour would be requisite for the simultaneous transmission of messages with extraordinary velocity to distances from one to upwards of four hundred miles. Simplicity, however, is the characteristic of Science, and certainly the attics or garrets of the London Central Telegraph Station strikingly illustrate the truth of the axiom: indeed, the whole of the Company's stock in trade which we found therein consisted of four or five bright-eyed, intelligent-looking boys, from fourteen to fifteen years of age, and eight little "*instruments*," each about half the size of those which German women and Italian men carry on their backs through the streets; and as our advertising horse-dealers, in offering, or, as it is technically termed, in *chaunting* their cob to the notice of "a heavy, timid gentleman," invariably assure him "that a child can ride it," so it may truly be said of the electric telegraph, which transmits its intelligence at the

incomprehensible rate of 280,000 miles *per second,* that *a boy can guide it!*

Although the ordinary rate at which electric communication is now effected has above been easily expressed by a few figures, it is evident that it is a velocity which the human mind has not power to comprehend.

When Shakespeare, in the exercise of his unbounded imagination, made Puck, in obedience to Oberon's order to him—

"Be here again
Ere the leviathan can swim a league,"

reply—

"I'll put a girdle round the earth
In forty minutes"—

how little did our immortal bard think that this light, fanciful offer of "a fairy" to "the king of the fairies" would, in the nineteenth century, not only be substantially realized, but surpassed, as follows.

The electric telegraph would convey intelligence more than twenty-eight thousand times round the earth, while Puck, at his vaunted speed, was crawling round it only *once!*

On every instrument there is a dial, on which is inscribed the names of the six or eight stations with which it usually communicates. When much business is to be transacted, a boy is necessary for each of these instruments; generally, however, one lad can, without practical difficulty, manage about three; but as the whole of them are ready for work by night as well as by day, they are incessantly attended in watches of eight hours each by these satellite boys by day, and by men at night.

As fast as the various messages for delivery, flying one after another from the ground-floor up the chimney, reach the level of the instruments, they are brought by the superintendent to the particular one by which they are to be communicated, and its boy, with the quickness characteristic of his age, then instantly sets to work.

His first process is, by means of the electric current, to sound a little bell, which simultaneously alarms all the stations on his line; and although the attention of the sentinel at each is thus attracted, yet almost instantly it evaporates from all excepting from that to the name of which he causes the index-needle to point, by which signal the clerk at that station instantly knows that the forthcoming message is addressed solely to *him*, and, accordingly, by a corresponding signal, he announces to the London boy that he is ready to receive it. By means of a brass handle affixed to the dial, which the boy grasps in each hand, he now begins rapidly to spell off his message by certain twists of his wrists, each of which imparts to the needles on his dials, as well as to those on the dials of his distant correspondent, a convulsive movement, designating the particular letter of the telegraphic alphabet required.

By this arrangement he is enabled to transmit an ordinary sized word in three seconds, or about twenty per minute. In case of any accident to the wire of one of his needles, he can, by a different alphabet, transmit his message by a series of movements of the single needle at the reduced rate of about eight or nine words per minute.

While a boy at one instrument is thus occupied in transmitting to—say Liverpool—a message written by its London author in ink which is scarcely dry, another boy at the adjoining instrument is, by the reverse of the process, attentively reading the quivering movements of his dial, which by a sort of St. Vitus's dance are rapidly spelling to him, *vid* the wires of the South-Western Railway, a message, say from Gosport, which word by word he repeats aloud to an assistant, who, seated by his side, writes it down (he receives it about as fast as his attendant can conveniently write it) on a sheet of paper, which as soon as the message is concluded descends to the "Booking Office;" where, inscribed in due form, it is without delay despatched to its destination by messenger, cab, or express, according to order. The following trifling anecdotes will not only practically exemplify the process we have just described, but will demonstrate the rapidity with which the Company are enabled to transmit messages.

Some little time ago, a gentleman, walking into the reception-hall of the London office, stated that he had important business to communicate to his friend at Edinburgh, who by appointment was, he knew, at that moment waiting there in the Company's Telegraphic Office to reply to it. On being presented with the half-sheet of paper, headed with its printed form as described, he wrote his query, which, after passing through the glass window to the "Booking Office," flew upwards to the Instrument department, from whence with the utmost despatch it was transmitted to Edinburgh, and, the

brief reply almost instantly returning to the instrument, it was committed to writing, and then lowered down to the "gentleman in waiting," who thus quietly walked off with his answer, which we were informed at the office he obtained within the space of five minutes, a considerable portion of which had been consumed by himself and his friend in writing the few words which had passed between them, for, during their passage and return, the electric wires had only detained them exactly the three hundred and fiftieth part of one second!

In a dull foggy day an engine on the London and North-Western Railway, tired of idly standing still with its steam up, suddenly ran away, and, without any one to guide it, proceeded at a rapid rate towards the Euston Station, where every one who witnessed its start expected it would create an amount of damage almost incalculable: but the electric telegraph, soon overtaking and passing the fugitive, conveyed intelligence to Camden Station in abundant time for full preparations to be made there for its reception, by turning the points of the rails into a sideway containing only a few ballast waggons.

In like manner a "gentleman" who had taken second-class tickets for himself and his family only, but who with them had been comfortably enjoying a first-class carriage, was greatly astonished on arriving at his destination to see standing at the window of his carriage, almost before the train had stopped, the Company's station clerk, who very loudly said to him, in presence of his fellow-travellers, "*Mr. Jonathan Jones, I'll trouble you for excess of fare for yourself and party.*"

Besides the transmission of *private* messages at charges averaging, say one-fortieth of a penny per mile per word, the Electric Telegraph Company have, in central situations in the principal towns of the kingdom, established stations whence and where information, messages, and despatches of a public character may be forwarded and received to and from all the other stations of the Company.

In each of these stations a room for subscribers has been established, in which is posted as fast as it arrives all intelligence of commercial or public interest: such, for instance, as—

Prices of Funds and Shares.
Money market.
Wind and Weather from about forty different parts of the kingdom.
Shipping arrivals and departures.
Losses and disasters at sea.
Sporting intelligence.
Corn market.
Corn averages.
Cattle market.
Hay market.
Meat market.
Coal, tallow, cotton, and iron markets.
General-Produce market.
General news of the day.
Parliamentary news during the Session.

It need hardly be stated that this heterogeneous information is principally imparted to the various stations from London, where it is concentrated by telegraphic announcements from all quarters.

The "Intelligence Department," which is distinct from the "Private Message Department," is solely for supplying news to the country subscription-rooms at Edinburgh, Glasgow, Liverpool, Leeds, Manchester, Hull, Newcastle, etc.

At seven in the morning the superintendent of the former department obtains all the London morning newspapers, from which he condenses and despatches to the several electric stations the information he considers most useful to each. The local press of course awaits the arrival, and thus by eight o'clock A.M. a merchant at Manchester receives intelligence which the rails can only bring at a quarter before two, and which cannot by rail reach Edinburgh till half-past nine P.M.

To Glasgow is transmitted every evening detailed intelligence for immediate insertion in the 'North British Daily Mail,' giving everything of importance that has occurred since the first edition of the London papers. Similar information is despatched to papers at Hull and Leeds.

By this rapid transmission of intelligence, the alternations in the prices of the markets at Manchester, etc. etc., being almost simultaneous with those of London, the merchants of the former are saved from being victimized by the latter. It is true that by great exertions prior intelligence may electrically be sent by private message; but as the wary ones cautiously wait for the despatch of the Telegraph Office, it has but little effect.

At one o'clock information is sent to all the electric reading-rooms of the London quotations of funds and shares up to that hour, thus showing the actual prices at which business has been done. The closing prices of the French funds for the day preceding are usually annexed, and the state of the London wind and weather at that hour.

Early in the morning the instrument boys are to be seen greedily devouring (for, with the curiosity, eagerness, and enthusiasm of youth, they appear to take great interest in their duties) the various matters which from all quarters at once are imparted to them.

One has just received intelligence by telegraph from Ely, announcing the result of the Lynn election. Another, a copy of a 'Moniteur' extraordinary, containing the first message of the President of the French Republic to the President of the National Assembly.

Another, that "Stewart's and Hetton's were nineteen and sixpence. Gosforth eighteen shill. Holywell fifteen and sixpence. Hastings Hartley fourteen and ninepence. S Q—market one hun. fifty one, sold one hun. and three —S Q.

"Market very good—P Q."

Another, the following characteristic description of the winds and weather of Old England at nine A.M. :—

Places.	Wind.	Weather.
Southampton	W.S.W.	Cloudy.
Gosport	S.E.	Cloudy.
Portsmouth	S.E.	Cloudy.
London	E.	Rain.
St. Ives	W.	Very fine.
Cambridge	S.W.	Cloudy.
Newmarket	E.	Cloudy.
Yarmouth	E.	Fine.
Lowestoft	E.	Stormy.
Norwich	E.	Fine.
Chelmsford	N.E.	Cloudy.
Colchester	S.E.	Fine.
Ipswich		Fine.

The above description of our changeable climate, it occurred to us, would not very incorrectly represent the present political state of Europe.

During the day telegraphic information flashes upon these boys *from the* STOCK EXCHANGE, informing them of "prices and closing prices of the funds and principal railway shares. With remarks."

FROM THE LONDON CATTLE MARKET, stating "the number and quality of beasts, sheep, calves, pigs. *Holland* beasts, sheep, calves. *Danish* beasts. With remarks."

FROM THE MEAT MARKET, stating "the prices of every description of meat, with remarks."

Also similar returns from all the other markets we have enumerated.

As fast as this incongruous mass of intelligence arrives, it is, in the mode already delineated, transcribed in writing to separate sheets of paper, which are without delay one after another lowered down to the Superintendent of "*the Intelligence Department,*" by whom they are rapidly digested for distribution either to the whole of the Company's reading-room stations, or for those lines only which any particular species of information may partially interest; such as corn-markets requiring corn intelligence; seaports, shipping news, etc. etc.

As quickly as these various despatches are concocted, the information they respectively contain reascends through "the lift," or wooden chimney, to the instrument department, from whence it is projected, or rather radiates, to its respective destination; and thus in every

one of the Company's reading-rooms throughout the kingdom there consecutively appears, in what would until very lately have been considered magic writing upon the walls, the varied information which had only reached London from all points of the compass *a few minutes ago!* But not only does this wonderful power, which it has pleased the Almighty to develope to mankind, facilitate in a most extraordinary degree our communication with each other, and thereby materially adds to our wealth, but it affords us a proportionate increase of power to defend that property which, by integrity and industry, our nation has, under Providence, been enabled to acquire.

In case of war, our Commander-in-chief would not only be made acquainted with information, even of the smallest importance, as soon as, or even before, it reached our shores, but he would simultaneously be enabled to deliver orders to the troops at every station in the kingdom as rapidly as if they were all assembled on the parade before him.

In like manner the Admiralty would receive intelligence and despatch directions, which, in combination with the arrangements at the Horse Guards, War Office, and Home Office, would give to our naval, military, and civil forces a combined strength which it has hitherto been impracticable for them separately to develope.

But to whatever amount the electric telegraph, used in the manner we have described, may facilitate the commerce and strengthen the defences of the Empire, there remains to be delineated an application of the discovery which, there can be no doubt, forms the most extraor-

dinary feat that the ingenuity of man has hitherto performed.

In a corner of one of the attics in which the eight electric instruments are placed, there stands a small very ordinary-looking piece of cheap machinery, composed of a few wheels, giving revolution to a small cylinder, upon which there has been wound a strip of bluish paper, half an inch wide and about sixty yards in length.

As this insignificant thread of paper slowly unrolls itself, the stranger observes, with feelings of curiosity rather than of surprise, that as it passes along a small flat surface, it receives from a little piece of steel wire, about a quarter of an inch long, and about the size of a large needle, a series of minute black marks, composed of 'dot and go one,'—two dots,—two dots and a line,—two lines and a dot,—three little lines and a dot,—and so on.

Now many of our readers will, no doubt, gravely exclaim,—*But who MAKES these dots?*

The answer in a few words explains the greatest mechanical wonder upon earth. The little dots and lines marked upon the narrow roll of paper revolving in a garret of the London Central Telegraph Station, are made BY A MAN SITTING IN MANCHESTER, who, by galvanic electricity, and by the movement of a little brass finger-pedal, is not only communicating to, but is HIMSELF actually PRINTING IN LONDON information which requires nothing but a knowledge of the dotted alphabet he uses, to be read by any one to whom it may either publicly or confidentially be addressed!!

Upon this fact comment is unnecessary. It humbles

rather than exalts the mind. Of such an invention it can only be said,

"NON NOBIS, DOMINE, SED NOMINI TUO DA GLORIAM."

To feed this instrument with paper there has been invented one of the most beautiful little toys we ever beheld, consisting of two iron fluted rollers, four feet long, which, by revolving against each other, draw between them on one side, and emit from the other, in a shower of fantastic writhing shreds, a hundred strips of paper half an inch broad at a time.

Before leaving the attics in which the electric printing as well as the eight telegraphic instruments are stationed, we may observe that the boys who work the latter form that amount of acquaintance with the workers of the distant instruments with which they have been in the habit of communicating, that, if from any reason their usual correspondents are removed, they instantly discover by the movement of the needles that they have to form an acquaintance with a new comrade, from whom, in leisure moments, they probably soon ascertain the fate of the old one; indeed, so completely is this description of acquaintance established, that it is not uncommon to hear a telegraph boy in the London attic suddenly exclaim, as he looks with joy at the quivering vibrations of his needles, which are working say from Manchester, "*Oh! here is Bill —— come back!*" There are, of course, however, exceptions to these kindly feelings; and accordingly two clerks, who had been employed at remote stations on the —— line, were lately separated, because

they were constantly electrically quarrelling and abusing each other by telegraph.

The working of these instruments requires, as may be supposed, undivided attention, and accordingly there is very properly affixed to the wall of the chamber in which they stand the following notice, which we implicitly obeyed:—

"Do not interrupt the clerks while engaged at the instruments."

As the Vicar of Wakefield's most important movements in life were "from the blue bed to the brown one," so we must now request our readers to migrate with us from the attics of the Electric Telegraphic Office to a low, dark, groined, Fifth-of-November, gunpowder-treason-and-plot-looking cellar, thirty-two feet long by five in width, containing three shelves, on which are to be seen, lying in double rows, thirty-four galvanic batteries, or, to speak in more homely terms, small open troughs, five inches broad, and either thirty-two inches or twenty inches in length. The largest, weighing, when charged, sixty pounds, are called "twenty-fours," because they contain that number of pairs of plates of copper and zinc, separated by a little sand, the whole being then brought into galvanic action by being sluiced with sulphuric acid and water mixed, in the proportions of one of the former to twelve of the latter.

The smallest, called "twelves," contain only that number of pairs of plates.

Of these batteries it requires from four to six of the largest to be applied to one instrument to blow a mes-

sage from London to Edinburgh. A single "twelve," applied to each instrument, will project intelligence to a range of four or five miles.

These batteries are connected with the eight instruments in the attics by small copper wires, which, to prevent confusion of action from contact one with another, are covered with cotton thread, saturated with a mixture of tar, resin, and grease.

With this simple precaution, nine wires, insulated from each other, are packed in a half-inch leaden tube, in which they again descend from the instruments to the cellar region. Four or five of these pipes are there stowed into an iron pipe, three inches in diameter, which conducts them under the foot pavement of the streets to the termini of the arterial railroads, alongside of which, and in the open air, a series of lines, resembling those on which music is written, composed of galvanized iron wire, stout enough to bear tension, and suspended by posts, have, as is well known, been constructed. Along the street pavement, at every quarter of a mile, there are cast-iron "*testing-posts*," to enable the Company's servants to examine all these wires, in order to detect and remove any that require to be renewed.

Although the London police have strict orders to allow no one to impede the thoroughfare of the public, and accordingly are everlastingly mumbling the unphilosophical monotonous exhortation of "*Get on, Sir!*" "*Move on, Ma'am!*" yet it is almost impossible for any ruminating being to walk the streets without occasionally pausing to reflect not only on the busy bustling

scenes which glide before his eyes, but on those which, at very different rates, are at the same moment flowing beneath his feet.

In our Metropolis, there is scarcely a street which does not appear to take pride in exposing as often as possible to public view a series of pipes of all sizes, in which fire of various companies, pure water of various companies, and unmentionable mixtures, abominable to all, pass cheek-by-jowl with infinitely less trouble than the motley human currents flow above them. But among all the subterranean pipes laid bare before us there is certainly no one which has more curious contents than the three-inch iron tube of the Electric Telegraph Company; and yet, of the multitudes who walk the streets, how few of them ever care to reflect what a singular contrast exists between the slow pace at which they themselves are proceeding, and the rate at which beneath their feet forty-five electric wires are transmitting in all directions, and to a variety of distances, information of every possible description!

How astonishing is it to reflect that, within the narrow space of the three-inch iron pipe that encases them, notice of a murder flying to London papers, is passing news from India going into the country; along another wire an officer is applying for his regimentals, while others are transmitting the "price of stocks," "news of the Pope," a speech from Paris of the "collapsed poet," with intelligence, public and private, of every imaginable nature.

In case, from the abrasion of the cotton that surrounds

the numerous copper wires within the pipe, any of them come into contact with each other, the intelligence each is conveying becomes suddenly confounded; in which case other wires must instantly be substituted. Indeed, even as regards the strong galvanized widely-separated iron wires which, in the open air, run parallel with our arterial railways, if in wet weather, in spite of the many ingenious precautions taken, the rain should form a continuous stream between the several wires and the ground, the electric fluid, escaping from the wires, is conducted by the water till it "finds earth," the best of all conductors: in which case, instead of the intelligence going on, say to Edinburgh, it follows the axiom of electricity by selecting the shortest road, and, thus completing its circuit through the earth, it returns to London. Sometimes, instead of going "to earth," it flies back to the office in London along another wire, to which, by means of a continuous line of water or by entanglement of the two wires, it has managed to escape; in which case, the messages on both wires wrangling with each other, the communication is stopped.

It is commonly asserted and believed that many birds are killed by merely perching upon the iron wires of the electric telegraph; but at any time they can do so with perfect impunity. If, indeed, a bird could put one of his feet on the wire, and with the other manage to touch the earth, he would then, no doubt, be severely galvanized. That the railway company's men often pick up under the wires of the electric telegraph partridges and other birds which have evidently been just killed—

indeed, some are found with their heads cut off—is quite true; but these deaths and decapitations have proceeded, not from electricity, but from the birds—probably during twilight or fog—having at full speed flown against the wires, which, of course, cut *their* heads off, just as an iron bar, without the aid of galvanism, would cut off the head of any man or alderman on horseback who, at a full gallop, was to run foul of it.

In windy weather the electric wires form an Æolian harp, which occasionally emits most unearthly music. "*I say, Jack!*" said an engine-driver to his stoker, who, like himself, was listening for the first time to this querulous sort of noise proceeding from the newly erected wires along his line, "*I say, Jack! ain't they a-giving it to 'em at Thrapstone?*"

When the posts and wires of the electric telegraph between Northampton and Peterborough were being erected, an honest farmer, who for many minutes had very attentively been watching the operation, inquired of the chief superintendent to what use it was to be applied? On being informed that by its means he would in a few minutes receive *at Wellingborough* a list of the Mark Lane prices *in London*, he evidently incredulously asked how that was to be done; and on its being explained to him that the intelligence would be sent down to him "*letter by letter*," he exclaimed, "But you don't mean to say that, besides letters, it will bring down PARCELS too?"

As the rails and electric wires are now immediately before us, we cannot refrain from observing that the two

inventions, like all branches of science, not only materially assist each other, but that the former, to a considerable degree, has created the latter. For instance, it may be truly said that Mr. M'Adam materially assisted the invention of the innumerable little four-wheeled carriages which burst into existence as soon as, in consequence of good roads, it became possible for a single horse to draw a whole family. In like manner, it may, we submit, be reasonably and fairly asserted that the gradients and police of the railways have materially assisted the invention, or rather the application, of galvanic electricity to wires, which, placed along unguarded high-roads, would have been practically useless.

On the outside of the Central Telegraph Station, as well as in the interior, there is an electric clock, which is worked by a small battery contained in a white jar capable of holding about three quarts. Its pendulum being operated upon by combined electricity with galvanism, the clock requires no winding up, and would therefore go perpetually, or rather as long as the battery lasts. If, instead of gas-burners, the Company would adopt the electric light, their establishment would then, *sui generis*, be complete.

Considerable instruction, seasoned with some little amusement, might, no doubt, be derived from a perusal of the variegated information, intelligence, and ordinary as well as extraordinary private messages which have been despatched and recorded by the electric telegraph; but the Company very properly faithfully refuse—be it important or unimportant—to unveil to any one what

they consider to have been confidentially entrusted to their care.

Those, however, who have recourse to the invention often divulge their own secrets; and accordingly here is one which came to us direct from one of the parties concerned.

During a marriage which very lately took place at ———, one of the bridesmaids was sympathetically so deeply affected by the ceremony, that she took the opportunity of the concentrated interest excited by the bride to elope from the church with an admirer. The instant her parents discovered their sad loss, messengers were sent to all the railway stations to stop the fugitives. The telegraph also went to work, and with such effect that, before night, no less than four affectionate couples legitimately married that morning were interrupted on their several marriage jaunts, and most seriously bothered, inconvenienced, and impeded by policemen and magistrates, who

> "Like envious clouds seem'd bent to dim their glory,
> And check their bright course to the *Occident*."

On the other hand, when it is considered that young people who form imprudent attachments, instead of being effectually cured, as in old-fashioned times, by distance, can nowadays, though four or five hundred miles apart, at any moment, by daylight or by moonlight, electrically converse with each other—in short, ask questions and give answers—it must be admitted that, although the galvanic telegraph has certainly triumphantly suc-

ceeded in stopping matches, it has possibly, if the real truth could be known, made many more than it has marred.

With respect, however, to communications of this delicate nature, we deem it our duty very gravely to warn our young readers, especially those of the fairer sex, that unless London time were to be adopted—as it is—at all the electric stations, a despatch would arrive at any western destination at an earlier hour than that at which it had left its eastern starting-post; and thus a young lady would appear to have affirmatively answered in Devonshire an important question—say seven minutes and a half before, according to her local clocks, it had actually been proposed to her in London!

In cases where crimes have been committed, the astonishing detective powers of the telegraph have already proved most valuable to the community. As, however, the instances which might be cited are end less, we will merely offer to our readers, as a solitary exemplification of the principle, the following

FRAGMENT.

* * * * * *

He never expected that! . . . He had made up his mind to give her the stuff,—he had deliberately bought it,—had paid for it,—had put it into his pocket,—had driven with it to the terminus of the Great Western Railway,—had flown with it along the rails to Slough,—had walked with it to the cottage.

He had already deprived the poor creature of her character, and now, on the first day of the year 1845, he had come down to her on purpose to deprive her of her life.

With affected kindness he had offered her refreshment,—had waited while, with his money, she went to buy it,—he had summoned up courage? . . . no, cowardice and wickedness . . . enough, secretly to pour the stuff from a tiny phial into the tumbler of porter he had just purchased for her,—he had seen her, with feelings of gratitude to him, raise the mixture to her faded lips, —he had watched her swallow the first mouthful—then another—then drink,—he had expected every instant, as she reached the drugs, to see his degraded victim drop down dead before his eyes;—he had prepared himself to bear all this, but he did not know that it was the nature of the horrid poison he had purchased to betray the hand that administered it. Oh! he never expected that loud, horrid, piercing, convulsive SCREAM!

As terrified and scared he opened the door to escape, the inhabitants of the neighbouring cottages, alarmed by the frightful noise they had just heard, sympathetically opened theirs. They saw him leave the house with hurried steps,—observed him make for the Slough road, where by another party he was observed to be "confused—to tremble—and on being addressed, to make no reply." And yet he had only done what he had deliberately intended to perpetrate:—he knew there was no rest for the wicked, but, oh! he had never expected that shrill, fearful, haunting *scream!*

On reaching the station he took his place in a departing train, and in a few minutes he apparently had effected his escape!

Everybody who has travelled by the Great Western Railway knows how joyously its well-appointed trains skim along the level country between Slough and London. He, no doubt, appreciated the speed—valued the wings with which he was flying—more than any of his fellow-passengers. He, probably, felt that no power on earth could overtake him, and that, if he could but dive into the mass of population in London, he would in perfect security flow among its streams unnoticed.

But whatever may have been his fears—his hopes—his fancies—or his thoughts, there suddenly flashed along the wires of the electric telegraph, which were stretched close beside him, the following words:—

"A MURDER HAS JUST BEEN COMMITTED AT SALTHILL, AND THE SUSPECTED MURDERER WAS SEEN TO TAKE A FIRST-CLASS TICKET FOR LONDON BY THE TRAIN WHICH LEFT SLOUGH AT 7H. 42M. P.M.

"HE IS IN THE GARB OF A QUAKER, WITH A BROWN GREAT-COAT ON, WHICH REACHES NEARLY DOWN TO HIS FEET. HE IS IN THE LAST COMPARTMENT OF THE SECOND FIRST-CLASS CARRIAGE."

And yet, fast as these words flew like lightning past him, the information they contained, with all its details, as well as every secret thought that had preceded them, had already consecutively flown millions of times faster; indeed, at the very instant that, within the walls of the little cottage at Slough, there had been uttered that

dreadful *scream*, it had simultaneously reached the judgment-seat of HEAVEN!

On arriving at the Paddington Station, after mingling for some moments with the crowd, he got into an omnibus, and as the tawdry thing rumbled along, taking up one passenger and putting down another, he probably felt that his identity was every minute becoming confounded and confused by the exchange of fellow-passengers for strangers that was constantly taking place. But all the time he was thinking, the cad of the omnibus—a policeman in disguise—knew that he held his victim like a rat in a cage. Without, however, apparently taking the slightest notice of him, he took one sixpence, gave change for a shilling, handed out this lady, stuffed in that one, until, arriving at the Bank, the guilty man, stooping as he walked towards the carriage-door, descended the steps;—paid his fare;—crossed over to the Duke of Wellington's statue, where, pausing for a few moments, anxiously to gaze around him, he proceeded to the Jerusalem Coffee-house,—thence over London Bridge to the Leopard Coffee-house, in the Borough,—and finally to a lodging-house in Scott's-yard, Cannon-street.

He probably fancied that, by making so many turns and doubles, he had not only effectually puzzled all pursuit, but that his appearance at so many coffee-houses would assist him, if necessary, in proving an *alibi;* but, whatever may have been his motives or his thoughts, he had scarcely entered his lodging when the policeman—who, like a wolf, had followed him every step of the way

—opening his door, very calmly said to him—the words no doubt were infinitely more appalling to him even than the *scream* that had been haunting him—

"HAVEN'T YOU JUST COME FROM SLOUGH?"

The monosyllable "NO," confusedly uttered in reply, at once substantiated his guilt.

The policeman made him his prisoner;—he was thrown into jail;—tried;—found guilty of wilful murder;—and —HANGED.

* * * * * *

A few months afterwards, we happened to be travelling by rail from Paddington to Slough, in a carriage filled with people, all strangers to one another. Like English travellers, they were all mute. For nearly fifteen miles no one had uttered a single word, until a short-bodied, short-necked, short-nosed, exceedingly respectable-looking man in the corner, fixing his eyes on the apparently fleeting posts and wires of the electric telegraph, significantly nodded to us as he truly muttered—

"THEM'S THE CORDS THAT HUNG JOHN TAWELL."

THE BRITANNIA BRIDGE.

In continuation of our sketch of the practical working of the London and North-Western Railway, we now offer to our readers a short descriptive outline of the aerial passages through which it is proposed by the Directors of the Chester and Holyhead Railway, that the public shall, without cuneiform sustentation, fly across the Menai Straits.

We shall divide our subject into the following compartments :—

1. The principle upon which the Britannia Bridge is constructed.
2. The mode of its construction.
3. The floating of its tubes.
4. The manner in which they are subsequently raised.

PRINCIPLE OF THE PROPOSED PASSAGE.

In the construction of a railway from Chester to Holyhead, the great difficulty which its projectors had to contend with was to discover by what means, if any, long trains of passengers and of goods, could, at undiminished speed, be safely transported across that great

tidal chasm which separates Carnarvon from the island of Anglesea. To solve this important problem the Company's engineer was directed to reconnoitre the spot; and as the picture of a man struggling with adversity has always been deemed worthy of a moment's attention, we will endeavour to sketch a rough outline of the difficulties which one after another must have attracted Mr. Robert Stephenson's attention, as, on the Anglesea side of the Menai Straits, he stood in mute contemplation of the picturesque but powerful adversaries he was required to encounter.

Immediately in his front, and gradually rising towards the clouds above him, were the lofty snow-capped mountains of Snowdon, along the sides of which, or through which, the future railroad, sometimes in bright sunshine, and sometimes in utter darkness, was either to meander or to burrow.

Beneath him were the deep Menai Straits, in length above twelve miles, through which, imprisoned between precipitous shores, the waters of the Irish Sea and of St. George's Channel are not only everlastingly vibrating backwards and forwards, but at the same time, and from the same causes, are progressively rising or falling from twenty to twenty-five feet with each successive tide, which, varying its period of high-water every day, forms altogether an endless succession of aqueous changes.

The point of the Straits which it was desired to cross —although broader than that about a mile distant, preoccupied by Mr. Telford's Suspension-bridge—was of course one of the narrowest that could be selected; in

consequence of which the ebbing and flowing torrent rushes through it with such violence that, except where there is back-water, it is often impossible for a small boat to pull against it; besides which, the gusts of wind which come over the tops, down the ravines, and round the sides of the neighbouring mountains, are so sudden, and occasionally so violent, that it is as dangerous to sail as it is difficult to row; in short, the wind and the water, sometimes playfully, and sometimes angrily, seem to vie with each other—like some of Shakespeare's fairies—in exhibiting before the stranger the utmost variety of fantastic changes which it is in the power of each to assume.

But in addition to the annoyances which air, earth, and water, could either separately or conjointly create, the main difficulty which Mr. Stephenson had to encounter was from a new but irresistible element in Nature, an "*orbis veteribus incognitus*," termed in modern philosophy, *The First Lord*, or, generically, *The Admiralty*.

The principal stipulation which the requirements of War, and the interests of Commerce, reasonably imposed upon Science was, that the proposed passage across the Menai Straits should be constructed a good hundred feet above high-water level, to enable large vessels to sail beneath it; and as a codicil to this will, it was moreover required that, in the construction of the said passage, neither scaffolding nor centring should be used —as they, it was explained, would obstruct the navigation of the Straits.

Although the latter stipulation, namely, that of constructing a large superstructure without foundation, was considered by engineers as amounting almost to a prohibition, Mr. Stephenson, after much writhing of mind, extricated himself from the difficulty by the design of a magnificent bridge of two cast-iron arches, each of which commencing, or, as it is termed, springing, fifty feet above the water, was to be four hundred and fifty feet broad and one hundred feet high—the necessity for centring being very ingeniously dispensed with by connecting together the half-arches on each side of the centre pier, so as to cause them, like two boys seated on the opposite ends of a plank supported only in the middle, to counterbalance each other. This project, however, which, on very competent authority, has been termed "one of the most beautiful structures ever invented," the Admiralty rejected, because their stipulated height of a hundred feet would only be attained under the *crown* of the arch, instead of extending across the *whole* of the watercouse. It was also contended that such vast cast-iron arches would take the wind out of vessels' sails, and, as a further objection, that they would inevitably be much affected by alternations of temperature.

Although this stern and unanticipated demand, that the passage *throughout its whole length* should be of the specified height, appeared to render success almost hopeless, it was evidently useless to oppose it. The child of science had neither the will nor the power to contend against men of war, and, accordingly, Mr. Stephenson

felt that his best, and indeed only, course was—like poor little Oliver Twist when brought before his parish guardians—"TO BOW TO THE BOARD;" and we beg leave to bow to it too, for, gnarled as were its requirements, and flat as were its refusals, it succeeded, at a cost to the Company to which we will subsequently refer, in effecting two great objects;—first, the maintenance for ever, for the purposes of War and Commerce, of an uninterrupted passage for vessels of all nations sailing through the Menai Straits; and secondly, the forcing an eminent engineer to seek until he found that which was required; in fact, just as a collision between a rough flint and a piece of highly-tempered steel elicits from the latter a spark which could not otherwise have appeared, so did the rugged stipulations of the Admiralty elicit from Science a most brilliant discovery, which possibly, and indeed probably, would never otherwise have come to light.

But to return to the Anglesea shore of the Menai Straits.

When Mr. Stephenson, after many weary hours of rumination in his London study, beheld vividly portrayed before him the physical difficulties with which he had to contend in the breadth and rapidity of the stream; when he estimated not only the ordinary violence of a gale of wind, but the paroxysms or squalls which in the chasm before him, occasionally—like the Erle King terrifying the "poor baby"—convulsed even the tempest in its career; and lastly, when he reflected that, constructing a passage so high above the water, he

was to be allowed neither centrings, scaffoldings, nor arches, it occurred to him, almost as intuitively as a man when his house is on fire at once avails himself of the only means left him for escape, that he could effect his object by constructing, at the height required, a straight passage, which, on the principle of a common beam, would be firm enough to allow railway trains to pass and repass without oscillation, danger, or even the shadow of risk; it, however, of course followed that an aerial road of this description should be composed of the strongest and lightest material; that its form should be that best suited for averting the wind; and lastly, that no expense should be spared to protect the public from the awful catastrophe that would result from the rupture of this "baseless fabric" during the passage over it of a train.

It need hardly be stated that, whatever might be the result of Mr. Stephenson's abstract calculations on these points, his practical decision was one that necessarily involved the most painful responsibility; increased, if possible, by the reflection that the Directors of the Chester and Holyhead Railway placed such implicit confidence in his judgment and caution, that they were prepared to adopt almost whatever expedient he might, on mature consideration, recommend.

In war, the mangled corpse of the projector of an enterprise is usually considered a sufficient atonement for his want of success; indeed, the leader of the forlorn-hope, who dies in the breach, is not only honourably recollected by his survivors, but, occasionally, by a glorious resurrection lives in the History of his country:

but when a man of science fails in an important undertaking, involving the capital of his employers and the lives of the public, in losing his reputation, he loses that which *never can be revived!*

Unawed, however, by these reflections, Mr. Stephenson, after mature calculations—in which his practical experience of iron ship-building must have greatly assisted him—confidently announced to his employers, and afterwards to a Committee of the House of Commons, by whom he was rigidly examined, first, that he had devised the means of accomplishing that which was required; and, lastly, that he was ready to execute his design.

The great difficulty had been in the conception and gestation of his project: and thus his severest mental labour was over before the work was commenced, and while the stream, as it hurried through the Menai Straits, as yet saw not on its banks a single workman.

The outline, or principle, of his invention was, that the required passage of passengers and goods across the Conway and Menai Straits should be effected through low, long, hollow, straight tubes—one for up trains, the other for down ones—composed of wrought-iron "boiler-plates," firmly riveted together. He conceived that, in order to turn aside the force of the wind, these tubes ought, like common water-pipes, to be made oval, or elliptical, and that they should be constructed at their final elevation on temporary platforms, upheld by chains, which—notwithstanding the evident objection, in theory as well as in practice, to an admixture of movable and immovable parts—might, of course subsequently be allowed to give to the bridge an auxiliary support, although

Mr. Stephenson's experience enabled him to declare, to the Committee of the House of Commons, very positively that no such extra assistance would be required. He proposed that the extremities of the tubes should rest on stout abutments of masonry, terminating the large embankment by which, from either side of the country, each end was to be approached; the intermediate portions of the aerial passage reposing at the requisite elevation upon three massive and lofty towers. Of these one was to be constructed at high-water mark on each side of the Straits. The third, no less than two hundred and ten feet in height, was to be erected as nearly as possible in the middle of the stream, on a tiny rock, which, covered with ten feet of water at high tide, although, at low water, it protruded above the surface, had long been considered as a grievance by boatmen and travellers incompetent to foresee the important service it was destined to perform.

The four lengths of each of the twin tubes, when supported as described, were to be as follows:—

	Feet.
From Carnarvon embankment, terminating in its abutment, to the tower at high-water mark .	274
From the latter tower to Britannia tower, situated upon Britannia rock, in the middle of the stream	472
From Britannia tower to that at high-water mark on the Anglesea shore	472
From the Anglesea tower to the abutment terminating the embankment which approaches it .	274
Total length of each tube . . .	1492
Total length of both tubes . .	2984

Notwithstanding the bare proposal of this magnificent conception was unanswerable evidence of the confidence which the projector himself entertained of its principles, yet, in justice to his profession, to his employers, to the public, as well as to himself, Mr. Stephenson deemed it proper to recommend that, during the construction of the towers, and other necessary preparations, a series of searching experiments should be made by the most competent persons that could be selected, in order to ascertain the precise shape and thickness of the immense wrought-iron, aerial galleries that were to be constructed, as also the exact amount of weight they would practically bear. In short, the object of the proposed experiments was to ensure that neither more nor less materials should be used than were absolutely requisite, it being evident that every pound of unnecessary weight that could be abstracted would, *pro tanto*, add to the strength and security of the structure.

Although it was foreseen, and very candidly foretold, that these experiments would be exceedingly expensive, the Directors of the Company readily acceded; and, accordingly, without loss of time, the proposed investigagation was, at Mr. Stephenson'e recommendation, solely confined to Mr. William Fairbairn, a ship-builder and boiler-maker, who was justly supposed to possess more practical experience of the power and strength of iron than any other person that could have been selected. Mr. Fairbain, however, after having conducted several very important investigations, deemed it necessary to apply to Mr. Stephenson for permission "to call in the

aid and assistance of Mr. Hodgkinson," a powerful mathematician, now professor in the University of London, and whom Mr. Stephenson, in his report to the Directors, dated February 9, 1846, declared to be "distinguished as the first scientific authority on the strength of iron beams." To these two competent authorities Mr. Stephenson subsequently added one of his own confidential assistants, Mr. Edwin Clark, a practical engineer of the highest mathematical attainments, who regularly recorded and reported to Mr. Stephenson the result of every experiment,—to whom the construction and lifting of the Britannia galleries were eventually solely entrusted, —and by whom an elaborate description of that work is about to be published.*

The practicability of Mr. Stephenson's hollow-beam project having thus, at his own suggestion, been subjected to a rigid investigation, we shall have the pleasure of briefly detailing a few of the most interesting and unexpected results; previous, however, to doing so, we will endeavour to offer to those of our readers who may not be conversant with the subject, a short, practical explanation of the simple principle upon which a beam, whether

* "With the sanction, and under the immediate supervision, of Robert Stephenson, Civil Engineer. A Description of the Britannia and Conway Tubular Bridges; including an Historical Account of the Design and Erection, and Details of the Preliminary Experiments, with the Theories deduced from them. Also, General Inquiries on Beams, and on the Application of Riveted Wrought-Iron Plates to Purposes of Construction; with Practical Rules and Deductions, illustrated by Experiments. By Edwin Clark, Assistant Engineer. With Diagrams, and a folio volume of Plates and Drawings, illustrative of the Progress of the Works. London: Published for the Author, by John Weale, 59, High Holborn."

of wood or iron, is enabled to support the weight inflicted upon it.

If human beings can but attain what they desire, they seldom alloy the gratification they receive by reflecting—even for a moment—on the sufferings which their fellow-creatures may have undergone in procuring for them the luxury in question. DIVES frequently extols his coals, his wine, his food, his raiment, his house, his carriages, and his horses; and yet how seldom does he either allude to or ruminate on the hardships and misery which, for his enjoyment, have been endured in coal-pits, lead-mines, sugar-plantations, cotton-fields, manufactories, smelting-houses, in horticultural and agricultural labour, by the sons and daughters of Lazarus!—and, if this heartless apathy disregards human beings, it may naturally enough be expected that, provided *inanimate* objects answer our purpose, we think not of them at all. And thus, if a beam without bending or cracking bears—as it usually does—the weight which the builder has imposed upon it, who cares how it suffers, or *where* it suffers?

For want, therefore, of a few moments' reflection on this subject, most people, in looking up at a common ceiling-girder, consider that the corresponding upper and lower parts thereof must, at all events, *pari passu*, suffer equally; whereas these upper and lower strata suffer from causes as diametrically opposite to each other as the climates of the pole and of the equator of the earth; for the top of the beam, throughout its whole length, suffers from severe compression, the bottom from severe extension; and thus, while the particles of the one are violently

jammed together, the particles of the other are on the point of separation; in short, the difference between the two is precisely that which exists between the opposite punishments of vertically crushing a man to death under a heavy weight, and of horizontally tearing him to pieces by horses!

Now this theory, confused as it may appear in our words, can at once be simply and most beautifully illustrated by a common, small, straight stick freshly cut from a living shrub.

In its natural form, the bark or rind around the stick is equally smooth or quiescent throughout; whereas, if the little bough firmly held in each hand be bent downwards, so as to form a bow, or, in other words, to represent a beam under heavy pressure, two opposite results will instantly appear; namely, the rind in the centre of the upper half of the stick will, like a smile puckering an old man's face, be crumpled up; while, on the opposite side, immediately beneath, it will, like the unwrinkled cheeks of Boreas, be severely distended—thus denoting, or rather demonstrating, what we have stated, namely, that beneath the rind the wood of the upper part of the stick is severely compressed, while that underneath it is as violently stretched; indeed, if the little experiment be continued by bending the bow till it breaks, the splinters of the upper fracture will be seen to interlace or cross each other, while those beneath will be divorced by a chasm.

But it is evident, on reflection, that these opposite results of compression and extension must, as they approach each other, respectively diminish in degree, until, in the

middle of the beam, termed by mathematicians "its neutral axis," the two antagonist forces, like the anger of the Kilkenny cats, or, rather, like still water between tide and back-stream, become neutralized, and, the laminæ of the beam consequently offering no resistance either to the one power or to the other, they are here literally useless.

As, therefore, it appears that the main strength of a beam consists in its external power to resist compression and extension, and that the middle is comparatively useless, it follows that in order to obtain the greatest possible amount of strength, the given quantity of material to be used should be accumulated at the top and bottom, where the strain is the greatest—or, in plain terms, the middle of the beam, whether of wood or iron, should be bored out. All iron girders, all beams in houses, in fact, all things in domestic or naval architecture that bear weight, are subject to the same law.

The reader has now before him the simple philosophical principle upon which Mr. Stephenson, when he found that he was to be allowed neither scaffolding, centring, nor arches, determined to undertake to convey at undiminished speed the Chester and Holyhead Railway's passenger and goods traffic across the Conway and Menai Straits through hollow tubes instead of attempting to do so upon solid beams; and as a striking and perhaps a startling exemplification of the truth of his theory, it may be stated that although his plate-iron galleries, suspended by the tension as well as supported by the compression of their materials, have on mature calculations

been constructed to bear nearly nine times the amount of the longest railway train that could possibly pass through them (namely, one of their own length), yet if, instead of being hollow, they had been a *solid* iron beam of the same dimensions, they would not only have been unable to sustain the load required, but would actually have been bent by—or, metaphorically, would have fainted under—their own weight!

EXPERIMENTS.

One of the most interesting and important results of the preliminary investigations so ably conducted by Mr. Fairbairn and his friend and associate Mr. Hodgkinson, was the astonishing difference found to exist between the power of cast and that of wrought iron to resist compression and extension. From the experience which engineers and builders had obtained in imposing weights upon cast iron girders of all shapes and sizes, it had long been considered almost a mechanical axiom that iron possessed greater power to resist compression than extension; whereas Mr. Fairbairn's experiments, to his surprise as well as to that of all who witnessed them, most clearly demonstrated that, after bearing a certain amount of weight, the resisting properties of cast and of wrought iron are diametrically opposite; in short, the results in figures proved to be nearly as follows:—

Cast iron can resist per square inch—

Compression of from . . 35 to 49 tons.
Extension of from . . 3 to 7 „

Wrought iron can resist per square inch—

Compression of from . . 12 to 13 tons.
Extension of from . . 16 to 18 „

The unexpected results thus obtained became of incalculable practical value; for, if the preliminary experiments proposed by Mr. Stephenson had not been made, he, Mr. Fairbairn, Mr. Hodgkinson, Mr. Clark, and indeed all the eminent engineers and mathematicians of the present day, would—on the apparently correct principle of everywhere adjusting the thickness of iron to the force it has to resist—have erroneously concurred in recommending that the proposed *wrought*-iron tubes for crossing the Conway and Menai Straits should be constructed stronger at bottom than at top, instead of, as ought to be, stronger at top than at bottom;—in consequence of which error the aerial gallery would have been improperly weakened in one part by an amount of iron which would unscientifically have overloaded it at another, and thus, like Falstaff's "increasing belly and decreasing legs," the huge mass, with diminished strength, would have laboured under unnecessary weight.

By continuing with great patience the experiments above referred to, it was finally ascertained that the relative strength of *wrought* iron in the top and bottom of the tubes should be in proportion of about five to four; and whereas, had they been constructed of *cast* iron, these proportions would have been reversed in the higher proportion of nearly five to one, it may reasonably be asked why, if the latter material bears compression so much better than the former, it was not selected for the

top of the tube? In theory this adjustment of the two metals to the force which each was peculiarly competent to resist, would have been perfectly correct. It however could not practically be effected, from the difficulty of casting as well as of connecting together plates ten and twelve feet in length of the very slight thicknesses required. Mr. Stephenson, therefore, adhered to his determination to make the whole of his aerial galleries of wrought iron; and we may here observe that, to ensure the public from accident, he further resolved that the amount of the force of extension upon them should be limited to only one-third of their power of resistance, that of compression to one-half—the reason of the difference being that, inasmuch as any little flaw in the iron would infinitely more impair its power to resist extension than compression, it was evidently safer to approximate the limits of the latter than of the former.

As the exact strength of a hollow wrought-iron tube such as was proposed was unknown to engineers, it was deemed necessary by Mr. Stephenson that its *form* as well as the disposition of its materials should be correctly ascertained. This portion of the investigation Mr. Fairbairn and his colleagues with great care and ability conducted by subjecting tubes of different shapes to a series of experiments, the results of which were briefly as follows:—

1. *Cylindrical tubes*, on being subjected to nine very severe trials, failed successively by collapsing at the top —or, in other words, by evincing inability to resist compression:—the tube, losing its shape, gradually became

elongated or lantern-jawed, while the two extremities were observed to flatten or bulge out sideways—besides which the ends, which for precaution sake rested on concentric wooden beds, invariably bent inwards.

2. *Elliptical tubes,* with thick plates riveted to the top and bottom, had been particularly recommended for experiment by Mr. Stephenson. These tubes under heavy pressure displayed greater stiffness and strength than round or cylindrical ones; but, after being subjected to a variety of torturing experiments of a most ingenious description, they all evinced comparative weakness in their tops to resist compression. They likewise exhibited considerable distortions of form.

3. A family weakness in the head having been thus detected in all models circular at bottom and top, *rectangular tubes* were in their turn next subjected to trial; and as they at once appeared to indicate greater strength than either of the other two forms had done, Mr. Fairbairn in favour of his new discovery abandoned both, as quickly as the American judge, on lately arriving at California, deserted the Bench for "the diggings."

The following is an abstract of the important result of about forty experiments made by Messrs. Fairbairn, Hodgkinson, and Clark, on the comparative strength of circular, elliptical, and rectangular tubes:—*Circular,* 13; *Elliptical,* 15; *Rectangular,* 21.

As soon as, by the investigation recommended by Mr. Stephenson, the rectangular was clearly ascertained to be the best form of hollow tube that could be selected, the next important problem to be determined by experi-

ment was what amount of strength should be given to it, or, in other words, what should be the thickness of its top and bottom, in which, as we have shown, consisted its main power.

The investigations on this subject soon demonstrated that if, instead of obtaining this thickness by riveting together two or three layers of plates, they were, on the principle of the beam itself, placed in horizontal strata a foot or two asunder—the included hollow space being subdivided by small vertical plates into rectangular passages or flues extending along the whole top as well as bottom of the tube—an immense addition of strength, with very nearly the same weight of material, would be obtained.

This adaptation proving highly advantageous, it was deemed advisable by Mr. Stephenson that further experiments should be made by Mr. Fairbairn and his colleagues to determine finally the precise form and proportions of the great tubes. For this object an entirely new model tube, one-sixth of the dimensions of the intended Britannia Bridge, was very carefully constructed; and the cellular tops and bottoms thereof, as well as the sides, were subjected to a series of experiments until the exact equilibrium of resistance to compression and extension, as also the variations in the thicknesses of the plates in the several parts of the tube as they approached or receded from different points of support, were most accurately ascertained.

In these as well as in all the previous experiments the trial tubes were loaded till they gave way—the re-

sults being accurately recorded and transmitted by Mr. Clark to Mr. Stephenson, who in return confidentially assisted Mr. C. with his opinion and advice. From the fibrous nature of wrought iron, as compared with the crystalline composition of the cast metal, the tendency to rupture in most of these experiments was slow and progressive. Destruction was never instantaneous, as in cast iron, but it advanced gradually, the material, for some time before absolute rupture took place, emitting an unmistakable warning noise; just as a camel, while kneeling on the burning sandy desert, writhing his head from one side to the other, snarls, grunts, grumbles, and groans louder and louder, as his swarthy turban-headed owners keep relentlessly adding package after package to his load.

Although it can mathematically be shown that the two *sides* of a thin hollow tube are of but little use except to keep the tops and bottoms at their duty—the power of resistance of the latter being, however, enormously increased by the distance that separates them—it was nevertheless necessary to ascertain the precise amount of lateral strength necessary to prevent the aerial gallery writhing from storms of wind. The riveting process was likewise subjected to severe trial, as also the best form and application of the slender ribs termed "angle-irons," by which not only the plates were to be firmly connected, but the tube itself materially strengthened—in fact, the angle-irons were to be its bones, the thin plate-iron covering being merely its skin.

In instituting the investigations we have detailed, Mr. Stephenson had two main objects. First, to determine by actual experiment what amount of strength *could* be given to his proposed galleries; and, secondly, of that maximum *how much* it would be proper for him to exert. And as his decisions on these subjects will probably be interesting to our readers, most especially to that portion of them whose fortunes or fate may doom them occasionally to fly through his baseless fabric, we will endeavour very briefly to explain the calculations on which they appear to have been based.

As a common railway train weighs upon an average less than a ton per foot,—as the greatest distances between the towers of the Britannia Bridge amount each to four hundred and sixty feet,—and as it is a well-known mathematical axiom among builders and engineers that any description of weight spread equally along a beam produces the same strain upon it as would be caused by half the said weight imposed on *the centre*—it follows that the maximum weight which a monster train of four hundred and sixty feet (an ordinary train averages about half that length) could at one time inflict on any portion of the unsupported tube would amount to four hundred and sixty tons over the whole surface, or to two hundred and thirty tons at the centre.

Now, to ensure security to the public, Mr. Stephenson, after much deliberation, determined that the size and adjustment of the iron to be used should, according to the experiments made and recorded, be such as to enable the aforesaid unsupported portions of the tube

(each four hundred and sixty feet in length) to bear no less than four thousand tons over its whole surface, or two thousand tons in the centre, being nine times greater than the amount of strength necessarily required; and as the results—unexpected as well as expected—of the searching investigation which had been instituted, incontestably proved that this Herculean strength could be imparted to the galleries without the aid of the chains, which, even as an auxiliary, had been declared unnecessary—and as Mr. E. Clark had very cleverly ascertained that it would be cheaper to construct the tubes on the ground than on an aerial platform as first proposed—Mr. Stephenson determined, on mature reflection, to take upon himself the responsibility of reporting to the Directors of the Chester and Holyhead Railway that this extra catenary support, which would have cost the Company £150,000, was wholly unnecessary. Indeed, such was the superabundance of power at his command, that, without adding to the weight of the rectangular galleries, he could materially have strengthened them by using at their top and bottom circular flues instead of square ones, which, merely for the convenience of cleansing, etc. were adopted, although the former were found on experiment to bear about eighteen tons to the square inch before they became crushed, whereas the latter could only support from twelve to fourteen tons.

But the security which Mr. Stephenson deemed it necessary to ensure for the public may further be illustrated by the following very extraordinary fact:—It has been

mathematically demonstrated by Messrs. Hodgkinson and Clark, as well as practically proved by Mr. Fairbairn—indeed it will be evident to any one who will go through the necessary calculations on the subject—that the strain which would be inflicted on the iron-work of the longest of Mr. Stephenson's aerial galleries by a monster train sufficient to cover it from end to end would amount to six tons per square inch:—which is exactly equal to the constant stress upon the chains of Telford's magnificent suspension Menai Bridge when, basking in calm sunshine or veiled in utter darkness, it has nothing to support but its own apparently slender weight!

Lateral Strength.—The aerial galleries having, as above described, been planned strong enough for the safe conveyance of goods and passengers at railway speed, it became necessary to calculate what lateral strength they would require to enable them to withstand the storms, tempests, squalls, and sudden gusts of wind, to which from their lofty position they must inevitably be exposed.

Now as the utmost pressure of the hurricane, as estimated by Smeaton, (but which is practically considered to be much exaggerated) amounts to about forty-six pounds to the square foot; it follows that on one of the large tubes (four hundred and sixty feet long by an average of rather less than thirty feet high) it would give a lateral pressure of two hundred and seventy-seven tons over the whole surface, or of a hundred and thirty-three tons on the centre.

To determine therefore the competency of the model tube to resist proportionate pressure to this amount, it was turned over on its side; and, having by repeated experiments been loaded and overloaded until it was crushed, the result fully demonstrated to Mr. Stephenson's satisfaction its power to resist, according to his desire, a lateral pressure more than five times greater than that which it is in the power of the hurricane to inflict.

The next points for consideration were, where these gigantic twin tubular galleries should be constructed, and, when constructed, by what power, earthly or unearthly—it will appear that the latter was found necessary—they should be raised to the lofty position they were decreed to occupy.

After much reflection on Mr. Clark's valuable suggestions on these subjects, Mr. Stephenson determined—1st, That the four shortest galleries, each two hundred and thirty feet in length, (to be suspended at the height in some places of a hundred feet between the two land towers and the abutments of the approaching embankments,) should, as he had originally proposed, be at once permanently constructed on scaffoldings in the positions in which they were respectively to remain; 2ndly, That the four longest galleries (each four hundred and seventy-two feet in length), which were eventually to overhang the Straits, should be completely constructed at high-water mark upon wooden platforms on the Carnarvon shore, about four hundred feet westward of the towers on which they were eventually to be placed: 3rdly, That to the bases of these towers they should, when finished,

be floated on pontoons, from which they were to be deposited on abutments in the masonry purposely made to receive them; and, 4thly, That the tubes should be raised to and finally deposited in their exalted stations by the slow but irresistible power of hydraulic presses of extraordinary force and size.

CONSTRUCTION OF THE TUBES AND TOWERS.

The locality selected for the formation of the tubes having been cleared, a substantial platform, composed of balks of timber covered with planks, was very quickly laid down.

In the rear of this immense wooden stage, which extended along the shore no less than half a mile, covering about three acres and a half, there were erected three large workshops, containing forges and machinery of various descriptions, for belabouring, punching, and cutting plate-iron. There were likewise contructed five wharves with cranes for landing materials, as also six steam-engines for constant work. The number of men to be employed was—

On iron-work about	700
At stone-work for the towers . .	800
Total	1,500

Besides temporary shantics, or wooden cottages, white-washed on the outside, which, like mushrooms, suddenly appeared in the green fields and woods immediately adjoining, accommodation was provided for a schoolroom, schoolmasters, clergyman, and, in case of accidents, a

medical man, the whole mixture being agreeably seasoned with wives, sweethearts, and children, sufficient for cooking, washing, sewing, squalling, etc. Nevertheless, notwithstanding these alluring arrangements, many sturdy independent workmen preferred sleeping in villages four and five miles off, to and from which they walked every morning and evening, in addition to their daily work; the remainder gipsying in the encampment in various ways, of which the following is a sample:—

An Irish labourer, known only by the name of "Jemmy," *bought* for himself a small clinker-built room. As "lodgings," however, soon rose in price, and as he had not time to keep a pig, he resolved to be satisfied henceforwards with half his tiny den, and, accordingly, he let the remainder to a much stronger fellow-countryman, who, being still less particular, instantly let half of his half to a broad-shouldered relation, until, like other Irish landlords we could name, poor "Jemmy" found it not only difficult to collect, but dangerous even to *ask* for, "his rint," and thus, in a short time, in consequence of similar "pressure from without," almost every chamber was made to contain four beds, in each of which slept two labourers.

As soon as the preliminary wharves, platforms, shanties, and workshops were completed, there commenced a busy scene strangely contrasted with the silence, tranquillity, and peaceful solitude that had previously characterized the spot. While large gangs of masons were excavating the rocky foundations of the land towers, sometimes working in dense groups, and sometimes in "double

quick time," radiating from each other, or rather from a small piece of lighted slow-match, sparkling in the jumper-hole of the rock they had been surrounding;—while carts, horses, and labourers in great numbers were as busily employed in aggregating the great embankments by which these towers were to be approached;—while shiploads of iron from Liverpool, of Anglesea marble from Penmon, of red sandstone from Runcorn in Cheshire, at rates dependent upon winds and tides, were from both entrances to the Straits approaching, or endeavouring to approach, the new wharves;—while almost a forest of scaffold-balks of the largest and longest description—like Birnam Wood coming to Dunsinane—were silently gliding towards the spot;—while waggons, carts, post-chaises, gigs, horses, ponies, and pedestrians, some of the latter carrying carpet-bags and some bundles, etc., were to be seen on both sides of the Straits, converging across the country to the new settlement, or diverging from it:—the unremitting clank of hammers,—the moaning hum of busy machinery,—the sudden explosion of gunpowder,—the white vapour from the steam-engines,—and the dark smoke slowly meandering upwards from their chimneys, gave all together interest, animation, and colouring to the picture.

As our readers will, however, probably be anxious to know how the great tubes we have delineated were constructed, we will shortly describe the operation, which, we are happy to say, is contained in a vocabulary of only three words, these aerial galleries being solely composed of Plates,—Rivets,—and Angle-Irons.

Plates.—The wrought-iron plates which form the top, bottom, and sides of the Britannia "*land*-tubes," two hundred and thirty feet in length, are, of course, slighter than those required for the four, each four hundred and sixty feet, which overhang the stream.

For these long tubes—which are of the same height and breadth as the shorter ones—the dimensions of the plates are as follows:—

For the bottom	12 feet in length, 2 feet 4 inches to 2 feet 8 inches in breadth, $\frac{7}{16}$ to $\frac{1}{2}$ inch in thickness.
For the top	6 feet in length, 1 foot 9 inches to 2 feet $1\frac{1}{2}$ inch in breadth, $\frac{5}{8}$ to $\frac{3}{4}$ inch in thickness.
For the sides	6 feet to 6 feet 6 inches in length, 2 feet in breadth, $\frac{1}{2}$ to $\frac{3}{4}$ inch in thickness.

Although these plates have been severally forged with every possible attention, yet, to render them *perfect* in thickness, they are not allowed by Mr. Stephenson to be used for the tubes until each has been passed by the Company's superintendent between two uncompromising massive iron rollers, worked by steam, which, by revolving, quietly remove or rather squeeze down that variety of pimples, boils, lumps, bumps, and humps, which, from unequal contraction in the process of cooling, occasionally disfigure the surface of plate-iron, and which, in the workman's dictionary, bear the generic name of "*buckles*." When the plates, the largest of which weigh seven hundredweight, have been thus accurately flattened, they are, one after another, according to their dimensions, carried by two or more men towards one of several im-

mense cast-iron levers, which, under the influence of steam, but apparently of their own accord, are to be seen from morning till night, whether surrounded by workmen or not, very slowly and very indolently ascending and descending once in every three seconds.

Beneath the short end of this powerful lever there is affixed to the bottom of a huge mass of solid iron a steel bolt—about the length and thickness of Lord John Russell's thumb—which, endowed with the enormous pressure of from sixty to eighty tons,* sinks, at every pulsation of the engine, into a hole rather larger than itself, perforated in a small anvil beneath.

As soon as each plate arrives at this powerful machine, the engineer in charge of it, assisted by the carrying-men, dexterously place the edge of the iron upon the anvil in such a position that the little punch in its descent shall consecutively impinge upon one of a series of chalk dots, which, at four inches from each other and one and a half inch from the edge, have been previously marked around the four sides of the plate; and thus four rows of rivet-holes averaging an inch diameter are, by the irresistible power we have described, pierced through plate-iron from one-half to three-fourths of an inch in thickness, quite as easily as a young cook playfully pokes her finger through the dough she is kneading, or as the child John Horner perforated the crust of his Christmas pie, when

> "He put in his thumb,
> And pulled out a plum,
> And said, What a good boy am I!"

* When this article was written Lord John Russell was Prime Minister.

Some of the steam arms or levers just described are gifted with what may be termed "double thumbs," and, accordingly, these perforate *two* holes at a time, or forty per minute,—the round pieces of iron cut out falling, at each pulsation of the engine, through the matrix or hole in the anvil, upon the ground.

When the plates have been thus punched all round, they are framed together on the ground in compartments of about twenty plates each (five in length and four in breadth), in order to be connected to each other by what are termed *covering-plates* and *angle-irons*.

In order to prepare the former (which are half an inch in thickness, one foot in breadth, and about two feet long), they are first heated in a small furnace, and then, instead of passing between rollers, they are put under a stamping, or, as it is technically termed, a *joggling*-block, which, by repeated blows, renders their surface perfectly flat; after which, a series of holes corresponding in size as well as in distance from each other, with those in the "plates," are punched all along their outer edges. When thus prepared, two of these small covering-plates—one on each side—are made to cover and overlap the horizontal line of windage existing between the edges of the plates, which, as we have stated, have been previously arranged so as to touch each other; and bolts being driven through the corresponding holes of the three plates, they are firmly riveted together by the process we shall now describe.

Rivets.—In the construction of the Britannia tubes there have been required no less than two millions of bolts, averaging seven-eighths of an inch in diameter,

and four inches in length. The quantity of rod-iron consumed for this purpose has, therefore, amounted in length to a hundred and twenty-six miles, and in weight to about nine hundred tons! The mode in which these legions of rivets have been constructed is briefly as follows:—

At the western end of the Company's principal forging establishment there stands a furnace or trough, full of pieces of rod-iron, from three inches and three-quarters to four inches and three-quarters in length, packed together as closely as soldiers in a solid square of infantry. As soon as, by the fiery breath of bellows worked by steam, they have been made uniformly red-hot, a little boy, rapidly, and without partiality, favour, or affection, picks them out one after another through the furnace-door with a pair of pincers, from which he quietly drops them perpendicularly into eight moulds, each of which being about three-quarters of an inch shallower than the length of the piece of iron it respectively receives, they of course all equally protrude about that distance above the surface.

In this position they are handed over to a pale engineman, or executioner, who with about as much mercy as Procrustes evinced towards those who slept on his bed, immediately places them upon an anvil, towards which there very slowly descends a huge superincumbent mass of iron pressed downwards by an immense long cast-iron lever worked by steam.

By this despotic power, the red protruding portion of each little rod is by a single crunch inexorably flattened, or "fraternized;" and thus suddenly converted—*nolens volens*—into a bolt, it is no sooner thrown upon

the ground, than the mould from which it was ejected is again, by the child in waiting, filled with another squad of raw red-hot recruits, who by a process exactly the reverse of decapitation are shortened, not by the *loss* but by the *acquisition* of a head!

However, after all, just as "the Marquis of —— is not the Duke of ——," so is a bolt not a rivet, nor does it become one, until, like a bar-shot, it is made double-headed, an important process which has now to be described.

As soon as each "set" of the half-inch iron plates which form the sides, top, and bottom of the Britannia tubes, have by a travelling crane been lifted—technically termed "picked up"—into their places, and have been made to touch each other as closely as possible, a movable stage on wheels is drawn close to the outside of the tube, for the purpose of firmly connecting these plates to those which on each side adjoins them. This work is performed by what is termed "a set of riveters," composed of two "Riveters," one "Holder-up," and two Rivet-boys.

As soon as the two first have ascended the scaffolding on the *outside* of the tube, and when the Holder-up, sitting on a board suspended by ropes from the roof, has exactly opposite to them taken up his position on the *inside*, one of the boys quickly abstracts from a travelling furnace, conveniently placed for the purpose, a red-hot bolt, which by a circular swing of his pincers he hurls inside the tube towards the other boy, his comrade or play-fellow, who, as actively, with a similar instru-

ment snapping it up, not only runs with it towards the Holder-up, but, as long as he can reach the rivet-holes, inserts it for him therein. The instant this is effected, the Holder-up presses against it an enormous iron hammer, which forces it outwards until it is stopped by its own head. The red protruding bolt is now mercilessly assailed by the two Riveters, whose sledge-hammers, meeting with a sturdy reaction from that of the Holder-up (which by a vast leverage or length of handle elastically returns blow for blow), the bolt, in about thirty seconds, becomes double-headed, when one of the Riveters, dropping his hammer, snatches up a steel mould about nine inches long, called *a swage*, which he continues to hold upon the newly-formed head until his comrade, by repeated blows of his hammer, has *swaged* it into a workmanlike form.

The bolt is thus finally converted into a rivet, which, by contracting as it cools, binds together the plates even more firmly than they had already been almost cemented by the irresistible coercion of three sledge-hammers; indeed they are so powerfully drawn together, that it has been estimated it would require a force of from four to six tons to each rivet to cause the plates to slide over each other.

The bolts for the upper holes of the interior, which, being about thirty feet high, are of course completely out of the Rivet-boy's reach, are dropped by him into a concentric iron ring, which, by a wire and cord passing over a pulley attached to one of the uppermost plates, is rapidly raised, until the Holder-up is enabled by pincers

to grasp the fiery iron, which,—on being inserted into its hole, he then instantly, as before, presses with his hammer.

By the operations above described, "a set of riveters" usually drive per day about two hundred and thirty rivets, of which in each plate there are about eighteen per yard, in two rows, averaging only two and a half inches of clear space between each bolt-head. On the large tubes alone there have been employed at once as many as forty sets of riveters, besides twenty-six "platers," or men to adjust the plates, each having from three to four men to assist him; and when this well-regulated system is in full operation it forms altogether not only an extraordinary but an astonishing scene.

Along the *outside* of the tube, suspended at different heights, are to be seen in various attitudes eighty Riveters—some evidently watching for the protruding red bolt, others either horizontally swinging their sledge-hammers, or holding the rivet-swage.

In the *inside* of this iron gallery, which is in comparative darkness, the round rivet-holes in the sides as well as in the roofs, not only appear like innumerable stars shining in the firmament of heaven, but the light beaming through each forms another as bright a spot either on the ground or on the internal surface of the tube. Amidst these constellations are to be faintly traced, like the figures on a celestial globe, the outlines of the Holders-up, sitting at different altitudes on their respective stages. Beneath them are dimly seen forty or fifty Rivet-boys, some horizontally hurling red-hot bolts,

others with extended pincers running forwards with them, while fiery bolts, apparently of their own accord, are to be observed vertically ascending to their doom. This Cyclopean dance, which is of course most appropriately set to music by the deafening reverberations of seventy or eighty sledge-hammers, is not altogether without danger, for not only does a '*holder*-UP' from a wrong movement occasionally—like a political Phaeton —all of a sudden tumble *down*, but the rivet-boys, generally unintentionally, but occasionally, it is said, from pure mischief, burn each other more or less severely, in which cases a couple of these little sucking Vulcans, utterly unable, from incessant noise, to quarrel by words, fall to blows, and have even been observed to fight a sort of infernal duel with pincers, each trying to burn his opponent anywhere and everywhere with his red-hot bolt!

But by far the most curious part of the riveting process is to be seen on the flat roof or top of the tube. This immense deck, which we have already stated to be four hundred and seventy-two feet in length, is composed of a pavement of plates to be connected together by eighteen longitudinal rows of rivets, the heads of which are to be only two and a half inches apart. Beneath this surface, at a depth of only one foot nine inches, there is, to give additional strength, a similar stratum of plates, the space included between both being divided into eight compartments called flues, twenty-one inches deep by twenty inches broad, exactly resembling those of a common stove. After the horizontal bottoms and upright sides of these eight flues have been firmly connected together

by the battering process we have just described, the upper stratum of plates are loosely laid down, and, being thus by the superincumbent weight of the iron covering securely adjusted, their final connection is effected as follows:—

A tiny rivet-boy—we observed one little mite only ten years of age—in clothes professionally worn into holes at the knees and elbows, crawling heels foremost for a considerable distance into one of these flues as easily as a ferret trots into a rabbit-hole, is slowly followed by his huge lord and master *the holder-up*, who exactly fits the flue, for the plain and excellent reason, that by Mr. Stephenson the flue was purposely predestined to be exactly big enough to fit *him;* and as, buried alive in this receptacle, he can move but very slowly, he requires some time, advancing head foremost, to reach the point at which he is to commence his work. On arriving there, his first process, lying on his left side, is with his right hand to pass through one of the rivet-holes in the plate above him a little strong hook, to which is attached a short hempen loop, or noose, which, supporting the heavy end of his huge hammer, forms a fulcrum upon which he can easily raise it against the roof, simply by throwing his right thigh and leg over the extremity of the long lever or handle of the instrument.

When by the injection of other little Rivet-boys and other stout Holders-up into several of the other flues, similar preparations have been made, the signal for commencing operations is given by several red-hot bolts falling, apparently from the clouds, among the Riveters,

who, leaning on their sledge-hammers, have been indolently awaiting their arrival. These bolts have been heated on the outside of the tube on the ground immediately beneath, in a portable furnace, from which a gang of lithesome rivet-boys in attendance extract them as fast as they are required, and then walking away with them, without looking upwards, or apparently caring the hundred-thousandth part of the shaving of a farthing where they may fall, or whom they may burn, they very dexterously, by a sudden swing of their pincers, throw them almost perpendicularly about forty-five feet, or about ten feet higher than the top of the tube, upon which, as we have stated, they fall among the assembled riveters as if they had dropped from the moon.

No sooner do these red-hot meteors descend upon the flat roof, than another set of rivet-boys eagerly snap them up, and then each running with his bolt, not to the spot where it is required, but to one of certain holes in the plate made on purpose for its insertion, he delivers it into the pincers of a little sweep, rivet-boy, or Ascanius, within the flue, who, having been patiently waiting there to receive it, crawls along with it towards his Pius Æneas, the stout recumbent *holder-up*. As soon as he reaches him he inserts for him the small end of the bolt into the hole for which it has been prepared, and through which, in obedience to its fate, it is no sooner seen to protrude, than the sledge-hammers of the expectant riveters, severely jerking at every blow the heavy leg of the poor holder-up, belabour it and "*swage*" it into a rivet.

The red-hot iron, unlike the riveters, cools during the

operation we have just described; and even if a by-stander, from being stone-blind, could not *see* the change in its temperature, it could easily be recognized by the difference in the *sound* of the hammers between striking the bolt while it is soft and hot, and when it has gradually become cool and hard. But whatever may be the variety of colours or of noises which accompany the formation of every one of these roof-rivets, it is impossible to witness the operation we have just described without acknowledging, with a deep sigh, how true is the proverb, that 'one half of the world,' especially the rich half, 'does not know how the other half lives;' indeed, unless we had witnessed the operation, we could scarcely have believed that any set of human beings, or rather of fellow-creatures, could professionally work from morning till night, stuffed horizontally into a flue of small dimensions,—that they could endure there confinement which only allows them, by changing from one side to another, to throw sometimes the right leg and sometimes the left over the elastic handle of a hammer,—and above all, that they could bear the deafening noises created close to and immediately thundering into their very ears!

In attentively watching the operations just described, we observed that at the *sides* of the tube it required generally eighteen blows of the hammer to flatten the end of the bolt, and then twelve blows on the "*swage*" to finish the head of the rivet; whereas, on the *roof*, the former operation was usually effected by only twelve blows, and the latter by eight or nine. At first, we conceived that this difference might be caused by a reduction

in the sizes of the plates and bolts: but those in the roof proving to be the thickest and longest, we, on a few moments' reflection, perceived that the reduction of labour in riveting the roof is caused by the sledge-hammers descending upon it by gravity as well as by the main strength of the riveters; whereas, at the *sides*, they are worked by the latter power only. The operation cannot, however, be carried on when the weather is either windy or wet.

The riveters, holders-up, and rivet-boys very properly receive high wages. The first of these classes, strange to say, look *down* upon the holders-*up* as their inferiors, or rather as their menials; again, the holders-up bully the little ragged-elbowed rivet-boys who wait upon *them;* but so it is, not only over the whole surface of the earth, but in the deep blue sea! In the stomach of the shark we find a dolphin, in whose stomach there is detected a flying-fish, which, on dissection, is found to have preyed on a smaller tribe, and so on. We have, therefore, no unkind reflections to cast upon "riveters," "holders-up," or "rivet-boys," for frowning upon, bullying, or burning each other.

Angle Irons.—The plates of the tubes, having throughout been scientifically adjusted in the different positions best suited to resist the variety of strains to which, from external or internal causes, they can possibly be subjected, are finally connected together by small ribs, which are firmly riveted to the plates. The quantity of *angle iron* thus worked through the top, bottom, and sides of all the tubes amounts to no less than sixty-five

miles! The sides are, moreover, connected to the top and bottom of each tube by small triangular plates, called *gussets,* which powerfully prevent the bridge from twisting or writhing under the lateral pressure of the wind.

THE FLOATING OF THE TUBE.

The Gathering.—On the principle of "Quæ regio in terris nostri non plena laboris?" we determined, quite in the family way, to join that respectable crowd of brother and sister reviewers, ill-naturedly called "gapers and gazers," who from all parts of the United Kingdom of Great Britain and Ireland, from the Continent of Europe, and even from the United States of America, were, in various degrees of agitation, converging upon North Wales, for the purpose of beholding something which, although unanimously declared to be "quite new," few appeared very clearly to understand.

All agreed that the wonder they wished to witness was *The Britannia Bridge:* but what was its principle or its form, what it was going to do, or what was to be done to it, no person appeared to be able to explain to anybody. Some nasally "guessed" it was to be raised; others, *ore rotundo,* positively declared it was to be only floated. One man truly enough affirmed, "it was to go from earth to earth, straight through the air, to avoid the water"—but by which or by how many of these three elements, or by what other powers, the strange transaction was to be effected, deponent, on cross-examination, was utterly unable to detail.

As the railway from Chester—where the principal portion of the travellers had concentrated—has for several miles been constructed along the sands of the Irish Sea, the passengers during that portion of their journey had ample space and opportunity for calm observation or reflection: as soon, however, as the heavily-laden trains reached Rhyl, there was gradually administered to the admirers of the picturesque a dose of intense enjoyment, mixed up with a smaller proportion of acute disappointment.

In flying over the valleys and round the hills and mountains of North Wales, there glided before their eyes a succession of beautiful scenery, which, illuminated by the sunshine of heaven, appeared, as they approached each great impending mountain, to be exquisitely improving; until all of a sudden—just as if the pestilential breath of an evil spirit had blown out the tallow-candle of their happiness—nothing in this world was left to occupy their senses but the cold chilly air of a damp dungeon rushing across their faces, a strong smell of hot rancid grease and sulphur travelling up their noses, and a loud noise of hard iron wheels, rumbling through a sepulchral pitch-dark tunnel, in their ears.

Hundreds of most excellent people of both sexes, who had been anxiously expecting to see

> "The rock—whose haughty brow
> Frowns o'er old Conway's foaming flood,"

were grievously chagrined and piteously disappointed by being told—as, like a pea going through a boy's pea-

shooter, they were flying through a long iron tube—that they were at that very moment passing it, Straits, Castle, and all. However, the balance of the account current was, on the whole, greatly in their favour, and thus, in due time and in high good-humour, all reached Bangor in safety.

It need hardly be said that, early in the morning of the day, or rather of the evening, on which the important operations at the Britannia Bridge were actually carried into effect, every boat that could be engaged, every 'bus, carriage, waggon, gig, cart, and hack-horse that could be hired in Bangor, Beaumaris, as well as in the neighbouring towns and villages, were in requisition to convey, by repeated trips, the curious to the object of their curiosity;—and certainly on reaching it the picture exhibited was one not very easy to be described.

The first amusing moral that irresistibly forced itself upon us, as our postilion with outstretched whip was endeavouring almost in vain to drive through the crowd, was, that of the many thousands of human beings who at considerable trouble and expense had assembled, more than nine-tenths were evidently wholly and solely absorbed in subjects which, though highly interesting, were alien to the purpose for which they had congregated!

Numbers of persons with heated faces, standing around small tables, allocated in various directions, were intently occupied in quaffing off a beautiful unanalyzed pink effervescing mixture, nicknamed by its proprietor "*ginger beer.*"

The dejected countenance of Punch's half-starved London dog, as, dead-tired of the gallows scene, he sat exalted on his tiny platform, was strangely contrasted with innumerable sets of strong grinning Welsh teeth and bright eyes, that in joyous amphitheatre were concentrated upon him. In several spots stooping groups of "ladies and gentlemen," horizontally looking over each other's backs, were intently watching what no one passing could possibly perceive—some trick of rude legerdemain upon the ground. On a small eminence the eyes of hundreds, as they stood jammed together, were elevated towards a jaded white-cheeked harlequin, and a painted-faced young lady in spangled trousers and low evening frock, who, on the elevated stage on which they stood, jumped, kicked with both legs, and then whirled violently on one, until the rustic clown, thoroughly satisfied with the sample, and unable to resist the alluring cymbals and brass trumpet that accompanied it, slowly ascended the ladder, surrendered his penny, and then, with his back turned towards the crowd, descended into a canvas chamber, to sit on a rough wooden bench, waiting to witness he knew not what.

In long rectangular booths, open at three sides, people, in great-coats and in petticoats, seated around a table, were all seriously occupied in silent mastication. In the moving crowd some were evidently searching for the party they had lost. Others, suddenly stopping, greeted friends they had not expected to meet.

Among the motley costumes displayed, by far the most striking was that of the Welshwomen, dressed in beau-

tiful gowns protected by frock-coats,—with neatly-plaited white caps, surmounted by large black hats, such as are worn elsewhere by men. But whatever were the costumes, ages, or condition, of the immense crowd of both sexes through which our old-fashioned vehicle slowly passed, everything that occurred seemed to elicit merriment, happiness, and joy. It was, in fact, a general holiday for all; and as boys out of school make it a rule never to think of their master, so apparently with one consent had the vast assemblage around us good-humouredly agreed together to cast aside the book they had intended to read—to forget the lesson they had purposely come to study.

By the kind attention of one of the Company's servants we were in a small boat conducted halfway across the rapid currents of the Menai Straits to the Little Rock, then completely beneath the water—upon which, under the able direction of Mr. Frank Forster, engineer of the line from Bangor to Holyhead, there had been erected (on a base embedded in pure Roman cement of sixty-two feet by fifty-two feet) the Britannia Tower, which, still surrounded by its scaffolding, majestically arose out of the middle of the stream to a height of two hundred and thirty feet.

This enormous structure, which weighs upwards of 20,000 tons, and which, from being roughly quarried or hewn, displays on the outside the picturesque appearance of natural rock, is a conglomeration of 148,625 cubic feet of Anglesea marble for the exterior—144,625 cubic feet of sandstone for the interior—and three hun-

dred and eighty-seven tons of cast-iron beams and girders worked in, to give, like ribs, strength, solidity, and security to the mass. The only way of ascending it was by a series of ladders, communicating, one above another, with the successive layers of horizontal balks, of which this immense pile of well-arranged scaffolding was composed;—and accordingly, hand over hand and step by step we leisurely arose, until we reached a small platform fifteen feet above the pinnacle of the Tower.

The view was magnificent. On the east and west, glittering in large masses, were to be seen the Irish Sea and St. George's Channel, connected together by the narrow Straits, whose silvery course, meandering in the deep chasm beneath, was ornamented and impeded by several very small rocks and islands, round and about which the stream was evidently struggling with great violence. Upon two or three of these little islands was to be seen, like a white speck, the humble cottage of the fisherman, who alone inhabited it Across the stream, about a mile towards the Irish Sea, there gracefully hung in a festoon, which, in the annals of science, will ever encircle the name of Telford, his celebrated Suspension Bridge, over which a couple of horses, appearing like mice, were trotting.

On the north lay extended a verdant country, surmounted in the direction of the new railroad by the Anglesea column, erected by the surrounding inhabitants to the Commander of our Cavalry at Waterloo; and about two hundred yards beneath this splendid testimonial, adjoining to a little isolated church, there modestly peeped up a very small free-stone obelisk,

constructed by the workmen of the tower on which we stood, as a humble but affecting tribute of regard to some half-dozen of their comrades, who—poor fellows!—had been killed in the construction of the Britannia Bridge.

On the south the horizon appeared bounded, or rather fortified, by that range of mountains, about forty miles in length, which bear the name of Snowdon, the loftiest among them being the well-known Patriarch of the group. Between the base of these hills and the Straits stood the little wooden city built for the artificers and workmen, its blue slates and whitewashed walls strongly contrasting with each other. In this vicinity we observed, in large masses and patches, the moving multitude through which we had just driven, and who, unsatiated with enjoyment, were still swarming round one object after another, like bees, occasionally dispersing only to meet again.

Lastly, close to the shore, on their wooden platform, from which the crowd was very properly strictly excluded, there reposed, slightly separated from each other, the sole objects of our journey—namely, the two sets of hollow tubes, four in number, which, under the sole superintendence of Mr. Edwin Clark, had been constructed as the aerial passages for the up and down trains across the Straits. Being each 472 feet in length, and being also of the height of an ordinary two-storied dwelling, they all together appeared like a street or row of chimneyless houses half a mile long, built on the water's edge; indeed, if windows and doors had been painted

upon them, the resemblance would have been perfect. Of the four lengthy compartments the two on the eastern extremity, and that on the western end, had been painted red; the remaining one, which in a few hours was not only to be launched but floated down the stream to the very foot of the tower on which we stood, had been finished off in stone-colour.

We would willingly conclude our slight panoramic picture by describing the appearance of the moving water gliding past the foot of the tower far beneath; but on going to the edge of the masonry to look down at it, we readily confess that we found it to be utterly impracticable to gaze even for a moment at the dizzy scene.

In descending from the eminence we had been enjoying, we paused at fifty feet from the top to inspect the steam-engine and boiler therein inserted for working two hydraulic presses, which rested principally upon a wall ten feet six inches thick, the other three walls being seven feet six inches in thickness. At 107 feet from the top, and 103 feet from the water, we again stopped for a few minutes, to enter the immense passage in the Britannia Tower, through which, strange to think, trains full of up and down passengers at railway speed are to pass and repass each other. The ends of the tubes from the Anglesea and Carnarvon Towers, now reposing far away on the beach, meeting at this point on immense cast-iron plates interposed on the masonry to secure an equal pressure, are not only to be firmly connected together, but are to be substantially riveted to the fabric.

To the opposite ends of these tubes, the extremities of those passing from the embankment to the two land towers just named are also in like manner to be firmly connected; by which means each aerial gallery will eventually be composed of a single hollow iron beam 1513 feet in length, far surpassing in size any piece of wrought iron-work ever before put together—its weight, 5000 tons, being nearly equal to that of two 120-gun ships, having on board, ready for sea, guns, powder, shot, provisions, crew, flags, captains, chaplains, admiral, and all!

Lastly, to bring the component parts of this not only extended but attenuated mass of iron into vigorous action, or in other words, to enable it to exert its utmost possible strength, Mr. Stephenson had directed that after the component parts of each of the two parallel tubes, by the process already described, have been firmly riveted into one continuous hollow beam, the extremities thereof shall be lowered about fifteen inches, by taking away the false keels or foundations, on which in their construction they had purposely been raised. By this simple operation it is estimated that the tube will receive a strength of thirty per cent. in addition to that which it possessed in separate lengths, and without the precise amount of tension so scientifically devised. When thus finally completed, its total length will amount to no less than 1841 feet.

To enable this enormous mass of thin plate-iron comfortably to expand and contract itself according to the temperature of the weather—a yawning enjoyment which

requires the space of about twelve inches—a number of cast-iron rollers, as well as of balls of gun-metal, all six inches in diameter, have been placed on immense cast-iron frames deposited on the land-towers and abutments,—and thus the tubes, like the tide beneath them, will flow forwards or ebb backwards at their free will and pleasure, or rather according to the immutable laws of the Omnipotent Power by which they have been created.

On crawling upon our hands and knees through a gap or hole in the masonry of the Britannia Tower, which had been kept open for the purpose of passing through it a stout hawser for hauling to its destination the floating tube, we suddenly perceived at its base, lying prostrate close beneath us—on a large platform, latticed like the grating of a ship, and under which the deep stream was rushing with fearful violence, boiling, bubbling, eddying around, as well as dimpling along the piles that obstructed it—what at the first glance very much resembled the main-sail of a man-of-war stretched out to dry, but which we soon discovered to be a conglomeration of the earth-stained fustian jackets, fustian trousers, dusty stockings, hob-nailed shoes, red sun-burnt faces, and brown horny fingers of a confused mass of over-tired labourers, all dead asleep under and around the stiff extended bars of the capstan which they had constructed, and at which they had been working.

Although they were lying, what in country parlance is termed "top and tail," jammed together so closely that in no place could we have managed to step between them, not a single eye was open,—scarcely a mouth shut. The

expression of their honest countenances, as well as of their collapsed frames, plainly told, not only how completely they had been exhausted, but how sweet was the rest they were enjoying. In the right-hands of several of them, old stumpy pipes, of different lengths, also exhausted, were apparently just dropping from their fingers; and while the hot sun was roasting their faces and bare throats, a number of very ordinary blue-bottle flies, as if in search of some game or other, were either running down their noses and along their lips to the corners of their mouths, or busily hunting across the stubble of their beards.

Although for some time "we paced along the giddy footing of the hatches" on which these fine labourers were snoring, gazing sometimes at them, sometimes at the wild scenery around them, and sometimes at the active element that was rushing beneath, no one of the mass awakened or even moved, and thus, poor fellows! they knew not, and never will know, the pleasure we enjoyed in *reviewing* them!

On rowing from Britannia Rock we had, of course, a full view of the remainder of the masonry, containing altogether no less than 1,500,000 cubic feet of stone, of which this stupendous work is composed. As, however, it would be tedious to enter into further details, we will merely, while our boat is approaching the shore, state, that the towers and abutments are externally composed of the grey roughly-hewn Anglesea marble we have described; that the land-towers, the bases of which are the same as that of the Britannia, are each 198 feet above

high-water, and that they contain 210 tons of cast-iron girders and beams.

The four colossal statues of lions—we must not compare them to sentinels, for they are *couchant*—which in pairs terminate the land ends of the abutments that on each side of the Straits laterally support its approaching embankment—are composed of the same marble as the Towers. These noble animals, which are of the antique, knocker-faced, pimple-nosed Egyptian, instead of the real Numidian form, although sitting, are each twelve feet high, twenty-five feet long, and weigh thirty tons. Their appearance is grand, grave, and imposing;—the position they occupy being 180 feet in advance of the entrances into the two tubes, which so closely resemble that over a drawbridge into a fortress, that one looks up almost involuntarily for the portcullis.

The picturesque network of scaffolding, nearly a hundred feet high, upon which the *short* tubes communicating from the Anglesea abutments to the land-tower had been constructed, was very cleverly composed of large solid balks of timber, from twelve to sixteen inches square, and from forty to sixty feet in length.

THE FLOATING OF THE TUBE.

On landing, we of course proceeded to the long range of tubes, or streets, we have described.

The arrangements which Mr. Stephenson had devised for floating the first of them to its lofty destination were briefly as follows:—

As soon as this portion of the gallery was finally completed, the props upon which it had rested, at a height above the wooden platform sufficient to enable artificers to work beneath it, were removed, so as to allow it to be supported only at its two extremities. The result of this trial satisfactorily demonstrated the accuracy of the calculations upon which the tube had purposely been constructed, arched at bottom to the height or "camber" of nine inches, in order that when the props that had supported it should be taken away, it should become perfectly straight—*which it did.*

During its formation a portion of the wooden platform under each of its ends was cut away, and the rock beneath excavated, until on either side there was formed a dock just large enough to admit four pontoons, each ninety-eight feet long, twenty-five feet wide, and eleven feet deep. When these docks were completed, the eight pontoons—scuttled at the bottom by valves which could either let in or keep out the water at pleasure—were deposited underneath them; and though their combined power of floatage amounted to 3200 tons, the weight of the tube, with its apparatus, being only 1800 tons, yet, in consequence of the valves being kept open so as to allow the tide to flow in and out, they lay on their bottoms like foundered vessels; and thus it was curious to see, crouching, as it were, in ambush beneath the tube, a dormant power, only waiting for the word of command, *up and at 'em!* to execute the duty they were competent to perform.

Besides these arrangements, Mr. Stephenson, in pursu-

ance of a plan which had been deliberately committed to paper, had ordered the construction, on the Anglesea and on the Carnarvon shores, as also on stages constructed on piles at the Britannia Rock, of a series of capstans, communicating with the pontoons by a set of ropes and hawsers more than two miles in length. Of these the principal were two four-inch hawsers, or leading-strings, between which, like a captive wild elephant between two tame ones, the tube was to be safely guarded, guided, and conducted from its cradle to its position at the feet of the Anglesea and Britannia Towers.

These preparations having been all completed, and every man having been appointed to his post, the valves in the eight pontoons were closed; in consequence of which they simultaneously rose with the tide, until their gunwales, like the shoulders of Atlas, gradually received their load.

At this moment the few who had been admitted to the spot, watched with intense anxiety the extremities of the tubes, which, from the severe pressure they had been inflicting, had, in a slight degree, forced their way into the wooden balks that had supported them. By degrees this pressure was observed perceptibly to relax, until a slight crack, and then a crevice, was seen to exist between the old points of contact. In a few seconds this little crevice was converted into daylight, amidst a general whisper of exultation, briefly announcing, "IT'S AFLOAT!" The tube, however, although no longer on earth, was still firmly retained in its dock by two conflicting powers —namely, one set of hawsers, maternally holding it to

the quiet home on which it had been constructed, and another set from the shore diametrically opposite, hauling it outwards to its destiny.

At this critical moment we ascended, by a long ladder, to the top of the tube, and had scarcely reached it when Mr. Stephenson very quietly gave the important word of command, *"Cut the land attachments!"* Some carpenters, all ready with their axes, at a few strokes nearly severed the strands, and, the tension from the opposite hawsers bursting the remainder, the long street, upon whose flat roof we stood, slowly, silently, and majestically moved from its dock into the water.

As the two extremities of the floating tube had been in *alignement* with those of the tubes on each side, which of course remained stationary, and whose roofs were loaded with well-dressed spectators, its advance was as clearly defined as that of a single regiment when, leaving its division to stand at ease, it marches by word of ommand from the centre out in front of its comrades.

Upon the deck or roof of the tube, which, we may observe, had no guard or railing, there was nailed Mr. Stephenson's plan, exhibiting the eight positions or minuet attitudes which the floating monster was to assume at different periods of its voyage; and, as it had a hundred feet to proceed before its first change, we had leisure to gaze upon the strange, interesting scene that surrounded us.

From the lofty summit of the Britannia Tower, surmounted by the Union Jack, to those of the Anglesea and Carnarvon Towers on either side of it, were sus-

pended, in two immense festoons, flags of all colours and of all nations. Every vessel at anchor, every steamer under-weigh, as well as several houses on shore, were similarly ornamented. At different points on each coast, and especially upon every eminence, were congregated large variegated masses of human beings. The great green woods of Carnarvon seemed literally swarming alive with them; and, to add to the audience, a large steamer—arriving almost too late—as it scuffled to a safe position, exhibited a dense crowd of black hats and showy bonnets, enlivened by a brass band, not unappropriately playing "Rule *Britannia*," the breeze wafting also along with it the manly, joyous song of the sailors, who, at the capstans on the opposite shore, were cheerily hauling in the hawsers upon which, for the moment, the thread of our destinies depended.

On the tube arriving at Position No. 2, it became necessary to exchange the mechanical power by which it had been forced broadside onwards, for that of the tide, which was to carry it *end* foremost down the stream to its goal. As, however, this latter power—to say nothing of a strong breeze of wind which drove the same way—would have propelled the lengthy mass more than twice as fast as it had been declared prudent it should proceed, a very strong power, by means of a small capstan, was exerted in each set of pontoons, to compress between wooden concentric clamps, the guide-hawsers; by which contrivance the pace was regulated with the greatest possible precision. This most important duty was confided to, and executed by, two volunteer assistants, Mr. Brunel

and Mr. Locke (we rank them alphabetically); and, although the whole scene of the floatation was one of the most interesting it has ever been our chequered fortune to witness, there was no part of it on which we gazed, and have since reflected with such unmixed pleasure, as the zeal and almost over-anxiety with which Mr. Stephenson's two competitors in fame stood, during the whole operation, intently watching him, until by either mutely raising his arms horizontally upwards, or in like manner slowly depressing them, he communicated to them his desire that the speed might be increased or diminished.

But besides regulating the speed, it was repeatedly necessary, especially at the points we have enumerated, slightly to alter the position of the tube by means of capstans, often working together with combined powers on different points of the shores. Orders to this effect were silently communicated by exhibiting from the top of the tube large wooden letters, and by the waving of flags of different colours, in obedience to which the men of all the distant capstans belonging to the letters telegraphically shown, were, at the same moment, seen violently to run round as if they had suddenly been electrified. Indeed at one point we observed the poor fellows all at once thrown upon their backs, in consequence of the rupture of their capstan-stop.

The duties of Captain Claxton—whose scientific and nautical acquirements had previously been evinced by floating the 'Great Britain' at Dundrum—were highly important. Besides the experienced opinions he had

contributed, he had sole command of the whole of the marine force; and accordingly from the top of the tube he continually, through his trumpet, communicated his orders to various small boats, which, as floating *aides-de-camp,* attended upon him.

As he was stepping ashore in the morning, we happened to see one of his crew, by suddenly pulling in the bow-oar, strike him so severely on the forehead that the blood instantly burst forth, as if to see who "so unkindly knocked." In half-a-dozen seconds however his pocket-handkerchief was tied over it, and he was giving his orders, if possible, more eagerly than before.

"*Jack!*" said a sailor from another boat, as with a quid in his cheek he slowly walked up to the coxswain, "*what's the matter with the Cappen's head?*"

"*A hoar struck him,*" was the reply to brother "Blue-jacket," who at once appeared perfectly satisfied, as if he well knew that it was in the nature of an oar to do so.

When the tube was at about the middle of its transit, a slight embarrassment occurred, which for a few minutes excited, we afterwards were informed, considerable alarm among the spectators on shore. In one of the most important of our changes of position, a strong hawser, connecting the tube with one of the capstans on the Carnarvon beach, came against the prow of a small fishing-boat anchored in the middle of the stream by a chain, which so resolutely resisted the immense pressure inflicted upon it, that the hawser was bent into an angle of about a hundred degrees. The

coxswain of a gig manned by four hands, seeing this, instantly rowed up to the boat at anchor, jumped on board, and then with more zeal than science, standing on the wrong side of the hawser, immediately put a handspike under it to heave it up. *That man will be killed,* said Mr. Stephenson very quietly. Captain Claxton vociferously assailed him through his trumpet, but the crew were Welsh,—could not understand English,—and accordingly the man, just as if he had been applauded, exerting himself in all attitudes, made every possible exertion, not only to kill himself, but his comrades astern, who most certainly would also have been nearly severed by the hawser, had it been liberated; but a tiny bump or ornament of iron on the boat's head providentially made it impossible, and on the hawser being veered out from ashore, the tube instantly righted.

The seventh movement brought the foremost end of the tube about twelve feet past the Anglesea Tower, and the rear end being now close to its destination, the hook of an immense crab or pulley-block, crawling through a hole purposely left in the masonry of the Britannia Tower, was no sooner affixed to it than the workmen at the capstan on piles, whom we described (see pages 263, 264) as asleep, instantly ran round, until the tube by main strength was dragged—like the head of a bullock in the shambles—to a ring from which it could not possibly retreat. By a combination of capstan-power on the North shore, the foremost or opposite end was now drawn backwards until it came to the edge of the Anglesea Tower; and although we were aware that the

measurements had of course been accurately predetermined, yet it was really a beautiful triumph of Science to behold the immense tube pass into its place by a windage or clear space amounting, as nearly as we could judge it, to *rather less than three-quarters of an inch.*

The tube having now evidently at both ends attained its position over the stone ledge in the excavation that had been purposely constructed for it, a deafening—and, to us, a deeply-affecting—cheer suddenly and simultaneously burst out into a continuous roar of applause from the multitudes congregated in all directions, whose attention had been so riveted to the series of operations they had been witnessing, that not a sound had previously escaped from them; nor had they, in any place, been seen to move from the spots at which they either stood or sat.

Mr. Stephenson took no notice whatever of this salute; indeed we much question if he even heard it, for his attention was otherwise occupied in giving to his able and confidential assistant, Mr. Wild, directions respecting the final adjustment of the temporary fastenings by which the tube was to be retained. However, the crowd of spectators—like that at a theatre when the curtain of a popular after-piece is about to drop—were already seen hurrying away in all directions, by steam, by boats, by carriages, and on foot, until, in the brief course of an hour, both coasts were clear; and yet, the most important of all the operations remained to be performed!

During the passage of the tube, the tide had become

high, had turned, and was now beginning to be violent; the valves therefore in the bottom of the pontoons having been partially drawn up, they gradually filled and sank, until the widely-separated ends of the tube slowly descended each to its respective shelf or ledge on its tower; and the discarded power that had successfully transported the vast gallery across the water then floating away with the stream—gently transferred from one element to another—the great tube was thus left in the aeriform position it had been planned to occupy.

During the operations we have detailed there were, of course, made by the spectators of both sexes a variety of observations of more or less wisdom, of which our limits will only allow us historically to record a sample of each.

"*Dear me!*" said an old gentleman, as the tube when it first swung across the Straits was seen in perspective approaching the platform on which he sat, immediately in front of the awful chasm between Britannia and Anglesea Towers, "*they have surely been and made it too* SHORT; *they must put a bit* ON!" As soon, however, as, veering round, it approached him broadside foremost, he whispered, "*I'm quite sure it's too* LONG; *they 'll have to cut a piece* OFF!"

A lady said to her companion, "*Mr. Stephenson appeared dreadfully excited during the passage! Didn't you observe how he kept continually stretching out his arms, raising them up and then sinking them down in this way?*" (suiting her words to the actions by which

the speed of the voyage had calmly been regulated): *"But, poor man, no wonder he was agitated!"*

The Company's servants were engaged long after sunset in securing and placing in safety the various materials, etc., that had been in requisition during the day, and it was not till past midnight that, over-tired, they managed one after another to retire to rest.

On the following morning, after we had bidden adieu to the hospitable inmates of a small wooden shanty, beneath the Anglesea Tower, in which we had been very kindly received, we had occasion to pass near to a stand which had been constructed in a peculiarly advantageous position, to enable the Directors of the Chester and Holyhead Railway to witness the operation. Upon the centre bench of this platform,—partially covered with bits of orange-peel, greasy papers that had contained sandwiches, and other such scraps,—we observed, reclining entirely by himself, a person wearing the easy garb of a gentleman, who appeared to be in the exquisite enjoyment of a cigar, the white smoke of which, in long and slow expirations, was periodically exuding from his lips, as with unaverted eyes he sat almost indolently gazing at the aerial gallery before him. It was the father looking at his new-born child! He had strolled down from Llanfairpwllgwyngyll, where, undisturbed by its consonants, he had soundly slept, to behold in sunshine and in solitude that which during a weary period of gestation had been either mysteriously moving in his brain, or like a vision—sometimes of good omen, and

sometimes of bad—had by night as well as by day occasionally been flitting across his mind.

Without however presuming to divine, from the rising fumes of his cigar, the various subjects of *his* ruminations, we will merely confess that, on looking up from our boat, as it glided away, at the aerial gallery he was contemplating, *we* were astonished to find ourselves very much in the frail predicament of mind of the old gentleman whose emotions of yesterday we so accurately delineated; for when the tube was lying on the Carnarvon shore we certainly fancied that it looked too heavy and too high for its object, whereas it now appeared almost too light and too low: in short, it had assumed the simple appearance which, in principle, it had been designed to bear,—that of a rectangular hollow beam; and although it had in fact annulled the awful chasm between the Anglesea and Britannia Towers, nevertheless, by exactly measuring it, it now appeared considerably to have increased it!

Moreover, in viewing this low narrow passage—only fifteen feet by thirty—which, without any cuneiform support, was stretching half across the Menai Straits—(it has been quaintly observed by Mr. Latimer Clark, that if this single joint of the tube could be placed on its tiny end in St. Paul's Churchyard, it would reach 107 feet higher than the cross)—it seemed surprising to us that by any arrangement of materials it could possibly be made strong enough to support even itself, much less heavily-laden trains of passengers and goods, flying through it, and actually passing each other in the air,

at railway speed. And the more we called reason and reflection to our assistance, the more incomprehensible did the mystery practically appear; for the plate-iron of which this aerial gallery is composed is literally *not so thick* as the lid, sides, and bottom of the elm coffin 6½ feet long, 2¼ feet wide, and 2 feet deep, which, by heartless contract, has been constructed of strength merely sufficient to carry the corpse of an emaciated, friendless pauper from the workhouse to his grave!

In fact the covering of this iron passage, 1841 feet in length, is literally not thicker than the hide of the elephant! Lastly, it is scarcely thicker than the bark of the "good old English" oak; and if this noble sovereign, notwithstanding the "heart" and interior substance of which it boasts, is, even in the well-protected park in which it has been born and bred, often prostrated by the storm, how difficult it is to conceive that an attenuated aerial hollow beam, no thicker than its mere rind, should by human science be constituted strong enough to withstand, besides the weights rushing through it, the natural gales and artificial squalls of wind to which throughout its immense length, and at its fearful height, it is permanently to be exposed!

RAISING THE TUBES.

Hydraulic Press.—Although the tube, resting at each end upon the ledge or shelf that had been prepared for it, had been deposited high enough to allow an ordinary boat to row under it, yet the heaviest job still remained;

—that of raising it about one hundred feet to its final resting-place. This operation, which might be compared to lifting the Burlington Arcade to the top of St. James's Church—supposing always that the said church arose out of a very deep, rapid water—was, as we have already stated, to be performed by the slow but irresistible agency of hydraulic power; and as one of the presses used is said not only to be the largest in the world, but the most powerful machine that has ever been constructed, we will venture to offer to those of our readers who may never have reflected upon the subject, a brief, homely explanation of the simple hydrostatic principle upon which that most astonishing engine, the hydraulic press invented by Bramah, is constructed.

If the whole of the fresh-water behind the lock-gates of a canal communicating directly with, say the German Ocean, were to be suddenly withdrawn, it is evident that the sea-side of the gates would receive water-pressure, and the other side none.

Now if a second set of gates were to be inserted in the salt-water at a short distance, say one foot, in front of the old ones—(the water between both sets of gates remaining at the same sea-level as before)—many, and perhaps most people, would believe that the pressure of the German Ocean against the new gates would of course relieve, if not entirely remove, the pressure against the old ones—just as a barrier before the entrance of a theatre most certainly relieves those between it and the door from the pressure of the mob without.

This opinion, however, is fallacious; for, supposing

that the new gates were by machinery to be firmly closed, the foot of salt-water included between them and the old gates would not only continue to press exactly as heavily against the latter as the whole German Ocean had previously done, but simultaneously inflicting the same amount of pressure against the inside of the new gates as the ocean was inflicting on their outside, the pressure of this imprisoned single foot of water would so accurately counterpoise that of the whole wide, free ocean, that if the machinery which had closed the new gates were suddenly to be removed, they (the new gates) would be found, as it were, vertically to float between the two equal pressures!

But anomalous as this theory may appear, it is beautifully demonstrated by the well-known fact, that if water be poured into a glass siphon, of which one leg is, say an inch in diameter, and the other, say a foot, the smaller quantity will exactly counterbalance the greater, and the water will consequently, in both legs, rise precisely to the same level; and this would be the case if one leg of the siphon were as large as the German Ocean, and the other as small as the distance between the two sets of lock-gates we have just described: indeed, it is evident that, if a hole were to be bored through the bottom of the new gates, a siphon would instantly be formed, of which the ocean would be one leg and the foot of included salt-water the other.

Now Bramah, on reflection, clearly perceived that from this simple principle in nature, a most important mechanical power might be obtained; for if, say five

ounces of water in a small tube, can be made to counterbalance, say a hundred thousand ounces of water in a large one, it is evident that by the mere substitution in the bottom of the larger tube of a flat solid substance instead of the water, a pressure upon the body so inserted of very nearly a thousand ounces would be inflicted by the application of only five ounces! and—as this pressure would of course be proportionately increased by increasing the height, or, in other words, the *weight* of water in the smaller tube—Bramah therefore further reasoned that, if, instead of adding to the quantity of water in the smaller tube, the fluid therein were to be ejected downwards by a common force-pump, the pressure upwards in the larger tube would proportionately be most enormously increased; and *à fortiori*, as the power of steam has lately been exerted in lieu of the old-fashioned forcing-pump, our readers will, we believe, at once perceive that, if the instrument which holds the water could be made strong enough, the pressure which might be inflicted within it by a few gallons of water might almost be illimitable.

The *principle* of the hydraulic press having been above faintly explained, the power and dimensions of the extraordinary engine of this nature, which has been constructed by Messrs. Easton and Amos, of Southwark, for raising the Britannia tubes, may be thus briefly described.

The cylinder, or large tube, of the siphon which is nine feet four inches in length, four feet ten inches in diameter, and which is made of cast-iron eleven inches

thick, weighs sixteen tons. The piston, termed *the Ram*, which, pressed upwards by the water, works within it, is twenty inches in diameter. The whole machine complete weighs upwards of forty tons. The force-pump barrel communicates with a slender tube or passage about the size of a lady's smallest finger, which like the touch-hole of a cannon, is drilled through the metallic side of the cylinder; and thus, although the siphonic principle really exists, nothing appears to the eye but a sturdy cast-iron cylinder of about the length of a 24 lb. cannon, having the thickness of metal of a thirteen-inch mortar.

From the above trifling data it will be evident that leaving friction and weight of the ram out of the question, the lifting-power of this machine must exceed the force applied to the force-pump in the same proportion that 1⅛-inch diameter bears to a diameter of 20 inches—which in figures amounts to about 354 to 1; and as the two 40-horse steam-engines which are to be applied to the touch-hole for compressing the water in the smaller tube would, it has been calculated by Mr. Latimer Clark, be sufficient to force the fluid more than five times as high as the top of Snowdon, or 5000 feet higher than the summit of Mont Blanc, our readers will at once become sensible of the extraordinary power which the hydraulic press of the Britannia Bridge is capable of exerting for the purpose of raising its tubes. In short, the power is to the weight of the tubes as follows:—

Weight of one of the largest tubes . . .	1800 tons.
Lifting-power of the hydraulic press . .	2622

The mode in which this enormous power is practically exercised is as follows:—

The hydraulic cylinder, standing erect, like a cannon on its breech, on two stout wrought-iron beams bolted to each other, is together with its steam-boiler securely fixed in the upper region of the Britannia Tower, 148 feet above the level of its base, and about forty-five feet above that to which the bridge is to be raised.

Around the neck of the iron ram or piston, which protrudes eight inches above the top of this cylinder, there is affixed a strong horizontal iron beam six feet nine inches in length,—resembling the wooden yoke used by milkmaids for carrying their pails,—from the extremities of which hang two enormous iron chains, composed of eight or nine flat links or plates, each seven inches broad, one inch thick, and six feet in length, firmly bolted together. These chains, which, in order to lift the tube to its destination, are required to be each 145 feet long, weigh no less than a hundred tons —which is more than double the weight of the equestrian statue of the Duke of Wellington, lately erected in Hyde Park, commonly regarded as one of the heaviest lifts ever effected: and certainly, when from the giddy region of the Britannia Tower, in which this hydraulic machinery, like the nest of an eagle, has been deposited, the stranger, looking down upon the enormous weight of iron not only to be supported but to be raised, compares the whole mass with the diameter of the little touch-hole immediately before him, through which the lifting-power has to pass;—and when he reflects that

the whole process can, with the greatest ease, be regulated and controlled by a single man, it is impossible to help feeling deeply grateful to the Almighty for having imparted to us a Power which, at first sight, has more the appearance of magic than of art.

As soon as all adjustments were prepared, and the boiler was sufficiently heated, the great piston, under the influence of severe pressure upon the water beneath it, began slowly, like a schoolboy's "jack-in-the-box," to emerge from the cylinder, and, apparently, like Atlas, regardless of the enormous weight that oppressed his shoulders, he continued steadily to rise, until in about thirty minutes he lifted the tube six feet; and, as he was not tall enough to raise it any higher, the huge chains beneath were immediately secured by a powerful vice or "clams" at the foot of the press. By letting off the water, which of course relieved the pressure beneath the piston, it descended, by its own gravity, to the point from which it had started, where the chains being again affixed to its yoke—an operation which required about half an hour—it again, by the vitality of steam, lifted its weight another six feet; and, as the other end of the tube was simultaneously treated in a similar way, the whole was progressively raised nearly thirty feet, when, by the bursting of the largest of the hydraulic presses—a contingency which, from the faithless crystalline character of *cast* iron, it is utterly impossible for Science to prevent—the ponderous mass suddenly fell through a space of seven inches—an awful phenomenon to witness—until it was stopped by the brickwork and timber

which had cautiously been underbuilt during its ascent —and from which it has still to be raised to a point a few feet above its final position, where a strong iron beam being placed beneath, it will, we trust, triumphantly be lowered to its final resting-place, to be the aerial highway of the public.

During our brief inspection of the Britannia Bridge, that wonderful piece of mechanism which we have now faintly described, we repeatedly paused, not only to reflect, but to regret how little the Public would probably ever think of, or care for, the assistant-engineers, overseers, skilled artificers, and honest steady labourers, by whose zeal, assiduity, and personal courage, Mr. Robert Stephenson's heavy job had practically been completed. "Who," we asked ourselves, "will ever care to thank those who, surrounded by the torrent, toiled by night as well as by day at the foundation of the Britannia Tower? When that beautiful structure of scaffolding, composed of 570,000 cubic feet of timber, upon which the land-tubes have been constructed, shall be removed, who will ever expend a moment in kindly recollection of those by whose skill it was devised, or by whose enduring patience it was at no trivial risk constructed? What reward, beyond their bare wages, will the superintendents of the various departments of the work ever receive for the anxiety they suffered for several years, under a weight of responsibility which, while it promised for success no rewards, threatened for failure the severest description of moral punishment?" And, lastly, we said to ourselves, as on

the top of the tube we stood over the holders-up and rivet-boys, who, stuffed together into flues, in the painful attitudes we have described, were working immediately beneath our feet, "Who, in flying across the Menai Straits, will ever feel that he is indebted for his life to the care and attention with which these poor fellows are patiently riveting, one after another, the millions of bolts by which he is to be safely transported in his aerial transit?"

THE LONDON POST-OFFICE.

HER Majesty's Postmaster-General is the Commander-in-Chief of an army of great magnitude, quartered not only over the whole surface of the United Kingdom and in almost every portion of the British Empire, but also at many Foreign Ports. His Secretaries form his Staff; his Surveyors are Commanders of Districts, to whom Postmasters report, and from whom in most cases they receive their orders. The General Post-Office in London—his Head-Quarters—is composed of a force of 2903 persons, divided into two Departments, each of which, without further flourish of trumpets, shall now rapidly pass before our readers in Review.

THE INLAND AND FOREIGN DEPARTMENT.

(COMMONLY CALLED THE GENERAL POST.)

The daily labour in London of this Office is composed of two very violent convulsions,—namely, the morning delivery and evening despatch; and two comparatively slight aguish shivers, caused by a tiny arrival and departure of letters by the day-mails.

At any period between these paroxysms, there reigns

throughout the department a silence and solitude similar to that which, during the hours of divine service, so creditably characterizes the streets of Edinburgh on the Sabbath-day. Save the ticking of the great clock, the stranger, as he paces from one large hall to another, hears nothing but his own footsteps; and with the exception now and then of a dark-coated clerk popping out of one door into another, of a bright red postman occasionally passing like a meteor across the floor, and of a few over-tired men in scarlet uniform sitting and lying in various attitudes,—like certain persons in the galleries of "another place," fast asleep—no human being is to be seen. While therefore this well-regulated and well-worked public department is enjoying its *siesta*, we will endeavour to offer to our readers a rough outline of the scene of its operations.

When the present London Post-Office in 1829 was completely finished, it was found, after all, to be not large enough for its business;—and accordingly its first effort to obtain additional accommodation was, in 1831, to construct upon iron cantilevers a gallery halfway between the floor and the roof of one-half of the great sorting chamber, a vast lofty double hall 109 feet long, 80 feet 6 inches broad, and 28 feet high. In 1836, to obtain further accommodation, it was determined to eject the Secretary from the building, and to appropriate his very handsome suite of apartments therein to the uses of the Office.

Nevertheless, as soon as Parliament adopted Mr. Rowland Hill's proposal of the Penny Post, this brick

and mortar boot, which had always been too tight, was found to pinch so intolerably, that various expedients, one after another, were resorted to. First it was determined to construct, over the double hall we have just described, another set or suite of the same dimensions, which, instead of resting on the ceilings of the old ones, were to be suspended from a strong, arched, iron-girder roof by iron rods. In effecting however this ingenious operation, the inevitable result has been that the principal hall on the ground floor is deprived of its skylights, and to the serious inconvenience of the poor fellows who work in it, and we must add, to the discredit of the country, this important portion of the London—and consequently of the largest Post-Office in the world—is now lighted almost entirely during the whole sunshine, even of summer, by stinking gas! But the increased accommodation thus obtained not fully meeting the requirements of the new system, a small hollow quadrangle, built for lighting another portion of the establishment, was on the ground-floor converted into a little office; and, finally, these efforts not affording sufficient room, the Money-order Office, president, clerks, windowmen, ledgers, documents, papers and all, were ordered to swarm and emigrate from the Post-Office into an immense hive or building purposely constructed to receive them.

Besides these patchwork arrangements there has been constructed at each end of the large double halls on both floors, a very ingenious contrivance, suggested by Mr. Bokenham, called "the lifting machine." Within a set of iron bars about three inches asunder, reaching verti-

cally from the floor of the lower halls to those above them, there are in strata, a series of platforms nine feet six inches broad by four feet deep, resembling the cages in which wild beasts at country fairs are usually confined, which, by the irresistible power of a steam-engine, are made on one side to rise twenty-eight feet, from the lower to the upper halls, and then, passing through a slit in the wall, to descend in like manner on the other side: the whole thus circulating like the buckets of a dredging-machine. By which contrivance sorters and letter-carriers, accompanied by their baskets and bags, instead of having to toil up and down a steep staircase, are quickly and most conveniently transferred from one set of halls to the other.

On the floors of both stories are arranged long double desks, separated by passages between each set, averaging about five feet in breadth—each great chamber being overlooked by two elevated platforms for the "Inspectors," who, just as Persians worship the sun, regulate the whole of their movements by the expressive but ever-varying features of the hall's huge round-faced clock.

At a few minutes before five P.M. the whole force of the Inland Department, refreshed by its siesta, having assembled, the business for the evening begins by the entrance on the lower floors, from various doors, of porters and carriers, bringing, in various attitudes, bags and baskets full of letters, which have been either collected by hand within the immediate vicinity of St. Martin's-le-Grand, or delivered into the slits or at the windows of its prepaying office.

At half-past five a stranger would fancy that the force assembled for the sorting of letters exceeded its work, and especially that by some unaccountable mystery the publication of newspapers, for the despatch of which the whole of the upper halls were in readiness, had been interdicted. On looking however into the large bins beneath the slits for receiving letters, white packets of all sizes and shapes are observed at about this period to drop down in arithmetical progression, increasing in number so rapidly that it soon occupies the attention of a sturdy porter to keep sweeping them with a broom into a heap, which, as fast as it can be tumbled into baskets, is carried away into the large sorting halls.

The fluttering, flapping, and flopping of all these letters —their occasional total cessation for a few seconds—and yet the almost awful rate at which they keep increasing, form altogether a very exciting scene.

As however the clock is unrelentingly progressing towards six P. M. we must reluctantly beg our readers to move with us from the letter-bins to an adjoining compartment, for the purpose of witnessing a moving picture of still greater interest.

At three-quarters past five a few newspapers, only by twos or by threes at a time, are to be heard falling heavily through broad slits into the spacious bins for receiving them, and the stranger has accordingly still reason to think that in the newspaper department of this world something somewhere must have gone wrong. In a few minutes, however, a professional, business-like tap is heard at the window, and a lean, tall, sinewy man-in-

waiting within it, hitherto unobserved, who, with his sleeves tucked up, has been standing like a statue on the interior sill, opening the sash, receives a dirty pocket-handkerchief full of newspapers, which he tumbles into a white wicker basket two feet three inches cube, standing all ready beneath. He has scarcely, with rather a disdainful jerk of his hand, returned the filthy rag to its still dirtier owner, when there is pushed towards him a large long sack, which in like manner having been emptied into the basket is chucked to its proprietor. Bags, bundles, and sacks of all sizes, shapes, and lengths, now arrive so rapidly, that the man-in-waiting suddenly throws open the whole of the window, and in receiving, emptying, and throwing about bags, he commences a series of gymnastic exercises which are astonishing to witness. On the night on which we beheld the operation it happened that the newspapers for the India Mail were to be added to those of the heaviest night of the week, in consequence of which the number of bags increased so rapidly, that an assistant porter of the same lean, active make, jumping on the broad sill, opened a second window. At five minutes before six these men were at times so nearly overwhelmed with bags of all colours and sizes, that most of those who had brought only large bundles chucked them themselves into the office. As the finger of the clock advanced the arrivals increased. As fast as the two men could possible empty and eject the sacks, the baskets beneath them (each holding on an average five hundred newspapers) were dragged by scarlet postmen into the lifting machine, in

which on its platforms they were to be seen through the bars of their respective cages, one set after another, rising towards the upper sorting halls. At a minute before six the two window-men were apparently working for their very lives;—parcels of newspapers like barred-shot hurled past them; single newspapers, mostly discharged by boys, were flying like musketry over their heads. At last the clock mercifully came to their rescue, and though its first five strokes seemed to increase the volley, the last had no sooner struck than, before its melodious note had completely died away, both the wooden windows of the newspaper receiving-room of the Inland Department, by a desperate effort, were simultaneously closed by the two lean janitors, whom, apparently exhausted by their extraordinary exertions, we observed instantly to sit down on a bar behind them, in order, in peaceful quietness, to wipe with their shirt-sleeves the perspiration which stood in dew-drops on their pale honest faces.

The following evening, at a quarter before six, we happened to witness from the *outside* the scene we have just described within.

Across the well-known thoroughfare passage, which separates the Inland, or General, from the London District, or old Twopenny Post, the public had during the day been passing to and fro in that sort of equable stream which, strange to say, seems all over London to be, generally speaking, about the same at the same hours in the same places. Occasionally a passenger, diverging sideways from the track, might be seen diagonally walking towards the slits on either side for the reception of

stamped letters, or with a half-crown, a shilling, or a penny, between his forefinger and thumb, to tap at the wooden window to pay for his letter.

However, at about three-quarters past five, the stream of passengers had not only evidently increased, but the rule of their conduct seemed gradually to have become reversed; for *now* the minority only proceeded soberly on the straight path, while the majority were observed to be diverging or reeling towards the windows of the Inland Department. Most of the latter multitude had letters in their hands; while others as they approached the slits were seen carefully taking them out of pockets in the breasts of their coats, or very cautiously out of their hats. Sometimes one of the narrow slits was wholly engrossed by a shabbily-dressed man, busily stuffing into it many hundreds of circulars, all exactly of the same shape, brought in several packets, which, without surrendering his position, one after another he untied. Clerks and men of business deposited their letters with real or affected gravity, and then turning on their heels walked seriously away. Boys generally came up whistling, and almost invariably twisted in their contributions with a flourish. At the compartment for prepaying letters we observed a little ragamuffin throw up his cap at the wooden window which he could not reach, and which, as in duty bound, instantly opened. As the finger of the clock advanced, the number of people bringing unpaid letters rapidly increased, until the receiving windows were beset by a motley crowd, apparently bent on obstructing the object of all by squeez-

ing each other to death. Several were mechanics, in dirty aprons, with begrimed faces, and with tucked-up sleeves, displaying bare, sinewy, useful arms. Among a number of women, each of whom, under high pressure, presented an outstretched arm with a penny and a letter at the end of it, we observed a short and very stout one holding a child whose whole face was seen squalling under a purple velvet bonnet and scarlet flowers. On the extreme left, people from all quarters were approaching the newspaper windows, with bundles and sacks; and although it now wanted only one minute to six, it was curious to observe how unconcernedly many of the men employed by the newspaper agents advanced with their bags, for the delivering of which they evidently well knew, from a glance at the clock, that there was "*lots o' time.*"

At the last moment, however, there certainly was a great rush; and when the final chime of six tolled, at which instant the windows of all the receiving compartments simultaneously closed, one or two newspapers, thrown by boys, were seen to fall from the shutters lifeless upon the ground; while at the windows for the receipt of pre-paid letters a group of persons for a few moments stood as if, for the amusement of the public, they were most admirably acting together a *tableau-vivant* of the words "Too LATE." The unfortunates, however, had evidently no appeal; for excepting the old scarlet-coated porter in waiting, who, as he had been doing all day, continued slowly and infirmly to pace up and down before the newspaper and letter windows, no human being on duty was to be seen.

It is impossible attentively to observe the picture we have just described, and which, with more or less colouring, may, excepting on Sundays, be witnessed any or every day in the year, without reflecting how strange it is that so many people of business, as well as of pleasure, should apparently combine together to defer not only till the very last moment, but occasionally until a very little bit beyond it, so important an act as the posting of their letters and newspapers. Instead, however, of blaming *themselves,* it is not at all an unusual course for people—on other subjects very sensible—to complain most bitterly to the Postmaster-General that they were actually at the window of the Post-office with money in their outstretched hands, to pre-pay the postage of their letters, when, at six o'clock precisely, the thing—so far as regards *penny* postage—suddenly and inexorably closed upon them! Hard however as it may appear to them, it must surely be evident to any one else that a series of vacillating orders, continually altering the last moment, would not in the smallest degree diminish either the pressure or the disappointment of those whose constitutional habit is invariably to wait until "the last moment," whatever it may be, has passed. At six o'clock there is no impracticable struggle *within* the Post-office. The hurry, confusion, and mortification *outside* have been created solely by the complainants themselves; and as they possess the power to remedy the evil, they had infinitely better determine to do so, than make themselves ridiculous by complaining of it.

We have said that as fast as the documents are poured

into the windows of the Inland office of St. Martin's-le-Grand, the letters are taken into the lower double hall, while the newspapers are simultaneously raised by steam-power into the upper one, for distribution and despatch. Shortly after six o'clock, however, red mail-carts from all the receiving-houses in London, as well as from that part of the country lying within the twelve-mile circle, in rapid succession appear driving up to the door of the main passage, through which, as quickly as they arrive, the bags of each are brought into the hall; and accordingly by half-past six the Inland Department—through which there have lately passed, per week, about 2,288,000 letters and 900,000 newspapers—is to be seen on both floors in full, in busy, and, we must add, in magnificent operation.

The contents of the bags, as fast as they arrive, are, at one end of the lower hall, tumbled in basketfulls upon a large table, twelve feet long by five feet broad, entirely surrounded by postmen in scarlet coats—a number of which are very creditably torn under the arms or across the shoulders, from over-exertion in hauling about heavy letter-bags. At first sight these men appear like a body of soldiers playing for their very lives at cards, each gambler at the same moment shuffling a separate pack. The object, however, of their manipulations is merely to "face" the stamped and paid letters all the same way. In doing so, whenever they come to an unpaid one, they eject or chuck it into the nearest of two baskets in the middle of the table. During the operation they also pass from one to another, towards the southern

end of the table, all large documents and "packets," which, as they accumulate, are carried off by red postmen to a table appropriated to receive them. Little letters, like little-minded men, sometimes improperly intrude themselves into the domiciles of bigger ones. The act is by "facers" called "pigging;" and it so often occurs, that in one week 727 notes had—it was ascertained by experiment—"pigged" into larger envelopes.

As fast as the letters of the great heap—which, by fresh arrivals, is seldom allowed to be exhausted—are thus unpigged and "faced," they are carried off in armfulls by porters to the stamping-table, where the date is marked on the back of each at the rate of two hundred per minute, and they are then taken to an adjoining table, where six clerks only perform the arduous but important duty of examining whether, in stamps, sufficient postage has been paid for each. The rapidity with which, as the letters lie with their faces uppermost, these officers successively touch them with one finger, is most astonishing. The great bulk, they can at once perceive, have been properly pre-paid; the remainder they snap up, weigh; and such is their cautious attention to their duty, that we remarked they were oftener wrong in their suspicions than right. The letters detected as underpaid are of course consigned to their proper punishment.

While this interesting operation is proceeding, red postmen in waiting are carrying off in armfulls all approved letters to two other tables, at which, if possible with still greater celerity, their stamps are obliterated

by the right-hands of twenty stampers, who from long practice in their regicidal duty can destroy from 6000 to 7000 Queen's heads in an hour, or, for a short time, 140 per minute! The mixture by which this operation is effected is, like some of M. Lamartine's radical speeches about liberty, equality, and fraternity, composed of linseed oil, lampblack, sweet oil, and a secret ingredient.

These preliminaries having been disposed of, the letters are carried to two very long double desks, severally divided into twenty-one compartments, to each of which there is attached a sorting clerk. As these compartments are each only two feet nine inches in breadth, the clerks are about as close together as friends seated at an ordinary dinner-table; their territory, however, in depth is only half as narrow as in breadth, and yet, most strange to say, within these tiny limits (for all these sorting-clerks perform exactly the same duty) is the whole of the correspondence of the United Kingdom, not only with itself, but with every region of the habitable globe, primarily arranged! The little desk of each clerk is divided at the back into two tiers of pigeon-holes, into which, taking up handfull after handfull of letters, he very dexterously divides them into great arterial lines labelled as follows:—

Northern Railway.	Midland Counties Railway.	Eastern Counties Railway.	South-Eastern Railway.	South-Western Railway.	Great Western Railway.	Blind.
London District.	Scotch.	Irish.	Liverpool Town.	Manchester Town.	Birmingham	Foreign.

Under the above arrangement it is curious to observe each sorting-clerk's share of the whole of the trans-marine (colonial and foreign) correspondence of Great Britain (excepting the large "packets," which we have stated are disposed of elsewhere) cooped up in a pigeon-hole only 4½ inches broad!

Between the sorters' double and single desks, which may be said to extend lengthways from one end of the great double sorting-hall to the other, there are passages five feet six inches broad, along which scarlet postmen are seen busily carrying letters from one set of tables to others.

We must, however, for a short time, take leave of the interesting scene, to view business which is simultaneously going on in other portions of the Inland Post-Office.

FOREIGN DEPARTMENT.

In the white massive wall of the north side of the great double sorting-hall, on the ground-floor, the stranger observes a lofty arch, over which is inscribed in large black letters the words COLONIAL AND FOREIGN DIVISION. Into this vestibule, which is only thirty feet long by eighteen feet broad, all the letters from all the little pigeon-holes marked "Foreign" are brought and thrown down upon a narrow table, twelve feet long by two feet broad, covered with green cloth, lighted by one gas-lamp, and divided into four compartments, each, of course, about three feet broad.

The back of each of these compartments is subdivided

into a double row of pigeon-holes 4½ inches broad, marked as follows:—

France.	Transit France.	Prussia.	Belgium.	Holland.	Hamburg.
Southampton.	East Indies.	West Indies.	America.	Ship.	Blind.

As fast as by a sorting-clerk the letters, like a pack of cards, are rapidly dealt out into these little holes, each class of them is carried off to a corresponding compartment, six feet long, at the side walls, on which are separately reinscribed the words France, Southampton, etc., as above, and upon their respective tables the letters, with the exception of those for "India," "America," "Ship," and "Blind," are finally arranged for despatch. The letters for America are despatched night and morning to Liverpool, where they are sorted; the Ship letters are forwarded through a wooden shaft into a room above; the Blind ones to the Blind-room; and those for India, which, however, it may be observed, seldom arrive until three or four days before the departure of the mails, to the end of the foreign vestibule, to be disposed of as follows.

To avoid the inconvenience of quarantine, and from other weighty considerations, it has been deemed proper by the Postmaster-General to protect by every possible precaution all letters, and even newspapers, for our Eastern dominions, which have to travel through France. Accordingly, the overland mails forwarded from London on the 7th of every month to Bombay, from whence the various bags are sent to their respective destinations, are

packed in wrought-iron *black* boxes, 1 foot 8 inches long, 1 foot wide, 10½ inches deep, and which weigh 13 lbs. (the newspapers, about 220 in each box, are in like manner generally packed separately); and as the letters tied up in unequal-sized parcels were one set after another deposited or lowered into these narrow coffins, we could not, as we stood witnessing the operation, but anticipate their resurrection in the Eastern world—and reflect how much happiness—and, alas! where black seals or edges were visible, what deep affliction would be created!

By the overland mail on the 24th of every month the letters and newspapers, averaging from 6000 to 7000 of the former, and from 8000 to 9000 of the latter, for our Eastern dominions, including Australia and Java, are in the following proportions packed into these iron boxes, painted (not all in black, like those sent on the 7th) but in the undermentioned colours of the brightest hues :—

	No. of Boxes.	Colour.
Bombay	20	Brown.
Calcutta	6	Blue.
Madras	6	Yellow.
Ceylon	13	Red.
Hong Kong Canton	5	Black.
Aden, *vid* Malta	4	White.
	54	

The number of iron boxes forwarded on the 7th and 24th have been as follows :—

1850.—Jan. 7, 61 „ 24, 49	110	Feb. 7, 58 „ 24, 67	125	Mar. 7, 43 „ 24, 68	111

At five minutes only before eight o'clock, the hour at which these metallic boxes are actually despatched, a curious and very interesting process takes place. Within each lid, which is made securely to overlap the receptacle for the documents, there are welded to a strong iron frame six stout notched square bolts, about six inches long, so adjusted as to fit exactly into the same number of corresponding spring catches within. No sooner, therefore, does a loud snap suddenly announce that the union has taken place than, like that of another description, it is out of the power of any human being to divorce "the parties," or, without metaphor, to open the box: as an additional precaution the interstices between the lids are then all the way round carefully soldered up; and lastly, by means of a red-hot iron, the Post-Office seal is affixed in solder.

On the outside of the top of each box are inscribed the words "India Mail, outwards;" and on the side, "India Mail." On the arrival of all these coffins in India, the lids are forcibly cut open by chisels, and their contents extricated.

There now only remains for us to say that as soon as the Post-Office clock strikes eight these black and variegated boxes are from the *door* of the vestibule (all other foreign mails being lowered by a rope and pulley from a *window* in the story above) packed into an "accelerator" omnibus, under the especial care of "the officer in charge," who never leaves them until he hands over his important charge to the commander of the British steam-packet at Marseilles.

The letters for India, etc. despatched from Southampton in steam-packets on the 20th of each month, are packed in pine boxes (painted the same colours as the iron ones above) two feet three inches in length by one foot three inches in width, as also in depth. The number usually despatched is as follows:—

1850.—On the 20th of January, 154; on the 20th February, 161; on the 20th of March, 141.

Those at least of our readers who have relations and friends in India will, we trust, forgive the minute details we have just offered.

PACKETS.

On its being notified by the Postmaster-General immediately after the establishment of Mr. Rowland Hill's Penny System, that, at progressive rates of postage, letters and "packets" of any description might—provided they did not exceed in weight 16 ounces—be forwarded by post, it was of course to be expected that there would suddenly arrive a crowd of rectangular parcels of various lengths, breadths, and thicknesses—some sealed, some wafered, some tied, but all containing written or printed documents of more or less importance.

It appears, however, from a most extraordinary ledger which we were permitted to peruse, that a portion of the public availed themselves of this inestimable literary indulgence with about as much consideration as a herd of very hungry pigs might be expected to evince on being allowed, for recreation, to walk in a garden of beautiful

tulips; and certainly, if the ghost of our old friend the late Sir Francis Freeling could but by conjuration be made to read the list of the "packets" which have been transmitted and delivered by post, it certainly, like that of Hamlet, would exclaim to the Postmaster-General—

> "Oh, horrible! oh, horrible! most horrible!
> If thou hast nature in thee, bear it not."

For instance, it appears that there have been transmitted as "packets"—From Blackburn, in Lancashire, to Spitalfields, London, two canary-birds, delivered by the postman alive and well. From Devonport to London, a pork-pie. To London, a woodcock, also a pair of piebald mice, which were kept in the Post-Office a month, fed, and at last delivered to the owner, who called for them. From Manchester to Castle-street, Borough, two rabbits, one bird, and fifteen parcels of plum-pudding. From Bognor to Plymouth, a lobster. In one day thirty-one letters containing wedding cake. On more than one occasion, without any envelope, a bank-note (one was for no less than £50), the two ends being merely folded upon each other, wafered, and the back of the note then directed! Innumerable leeches in bladders, several of which having burst, and the water having wetted the letters, many of the poor creatures were found crawling over the correspondence of the country. From Plymouth to "Hunmanby," a bottle of cream. From a mother to her son, a pottle of strawberries, which, being smashed in the bag, completely destroyed a "packet" full of very valuable lace addressed to the late Queen Dow-

ager. A ship-biscuit, the address being on a very small piece of paper pasted thereon. From Totness to Dublin, an uncovered bottle full of liquor, merely labelled with an address and the words "sample of cider." From Exmouth to Hastings, half a pound of soft-soap in thin paper. From Bishop's Stortford to Brunswick-square, a fish; also several packages of plants in wet moss. From Hastings to Bath, a bunch of grapes; also shrimps. From Kingston to Westminster-Bridge-road, to Mrs. ——, a roast duck. A flask of gunpowder. Fifty-three separate "packets," containing each a box of lucifer-matches, one of which, on being handled, exploded in the Post-Office. A traveller or bagman wrote to his beloved wife for his pistol; she affectionately sent it, merely labelled, loaded almost to the mouth with powder, ball, and slugs. To the Countess of ——, a pair of flesh-brushes; the mail-cart in conveying them was upset into a brook, which dissolving the paper covering of these brushes, they professionally set to work and destroyed a considerable portion of the epistolary contents of the bag. To Mr. ——, a live snake. From London to Wellington, Somersetshire, a very long cucumber. To a naturalist in London, a live mouse, two china teacups, and a box of live spiders. From Oxford-street to Merrion-square, Dublin, addressed to Miss ——, a most beautiful head-dress of the genus Jigamaree. From London to Sudbury, two sweetbreads. To ——, a human heart; a partridge; a mackerel; a paper of fish-hooks; a human stomach, etc. etc. etc.

THE BLIND MAN.

Our readers will have observed that in the first operation of dividing into fourteen main classes the whole of the letters for the United Kingdom, as well as for all foreign countries, which pass daily through the Inland Department of the London Post-office, there exists, among the above number of pigeon-holes one marked "BLIND."

Into this little hospital for the destitute or houseless poor, are thrown, by each sorter, throughout the department, all letters bearing either an illegible, an incomprehensible, or an inadequate address. It appears, from several experiments which have been made in the Post-Office, that of any given number of letters taken up at random as they are poured out of the bags, about one-tenth of them have not, on their addresses, any post town! On one day, 3559 letters arrived at St. Martin's-le-Grand addressed "London" only; most of them being to petty shopkeepers, who, with a turkeycock's desire to look grand, had struttingly supplied their country correspondents with this single word as their sufficient address; and yet, such is the intelligence of the Post-Office—such its triumph of mind over matter—that every one of these letters was delivered to the person for whom it was meant!

We must here pause for a moment to observe, that it would relieve the servants of the Post-Office from infinite vexation and trouble, and, to the advantage of all classes, would consequently materially expedite the delivery of

letters, if the public, of their own accord, would, or by the imposition of a heavy extra postage were to be obliged to reverse the existing foolish fashion by writing legibly, as *the first* word of the address of every letter—the only one out of the present confused irrelevant mass which the sorter wishes to discover, and has now to search for—namely THE POST TOWN; after which the name of the pretty little village, of the county, of 'the Hall,' 'the Lodge,' 'the Grove," or anything else, might at any length be most harmlessly inserted—with, lastly, that which is of no earthly importance except to the postman who actually delivers the letter, the name of Hobs, Dobs, or Snobs; in short, of the person or personage to whom it is addressed.

The duty however of solving all the enigmas, and of deciphering those astonishing specimens of writing that are continuously afflicting the Inland Post-Office, is imposed upon a gentleman selected from all the sorting-clerks, and who, from being gifted with extraordinary memory, very sharp wits, and above all, with what Mr. Samuel Weller termed "a pair of patent double-million-magnifying-gas-microscopes-of-hextra-power eyes," is officially distinguished throughout the department, as well as in its books, by the title of *"The Blind Man."* Accordingly, to his little desk, five feet long, two broad, modestly leaning against the wall of a small chamber close to the "Foreign" room, and adjoining the large double sorting-hall, are brought all the letters which each of the twenty-one sorters has, in despair, chucked into his "blind" pigeon-hole; and as, gazing for several

minutes at nothing but the blind man's back, we beheld one basketfull of botherations after another brought to him, we could not—when we considered that this badgering is mercilessly continued throughout every day, week, month, and year of his life—help wondering why the Society for the Prevention of Cruelty to Animals has not yet come to his rescue!

No one however who has watched the facility with which every compositor in a printing-office can read bad writing, would be much surprised at the ease with which the blind man gets over that portion of his troubles. Indeed as almost any person can readily learn to understand "broad" Yorkshire, broad Devonshire, broad Scotch, or any other *patois*, so it is not, on reflection, surprising that a gentleman of ready abilities should, in due time, learn to decipher "broad writing"—such as "sromfredevi," for Sir Humphry Davy; "Ner the Wises," for Near Devizes; "Biley Rikey," for Billericay; "Steghelhester Sussexese," for Chichester, Sussex; "Wardling-street, Noher Londer Brutz Schibseed," for Watling-street, near London Bridge, Cheapside; "Wharan Que ner Ne Wcasal Pin Tin," for Wareham Quay, near Newcastle-upon-Tyne, etc. etc. But where the direction is incorrect, or, as in the generality of cases (especially in circular tracts addressed by religious societies to our clergy at their parish "Rectories," "Vicarages," etc.), the post towns are omitted, the difficulty is not only clearly evident, but it at first appears to be insuperable; nevertheless, in attentively watching the blind man's back, it is astonishing to observe how easily and

fluently he does his work. For a considerable time he is to be seen, writing post-haste evidently from memory, the omitted post towns on each letter, as rapidly as he can handle them. Now and then, as if his gas-lamp had, without any apparent reason, half fainted away, he holds a letter before him for a few moments, turning it a little on this side, and then on that, until by a mental spark he suddenly deciphers it. In extreme cases, he is now and then obliged convulsively to scratch the side of his head, just above his right ear, for half a second with the sharp-pointed black holder of his iron pen: however, on he goes, placing occasionally beside him, at the left extremity of his desk, those letters for which reference to a little library, arranged before him, is necessary; and thus, with the help of about half-a-dozen thick well-thumbed books and of an intelligent assistant who sits beside him, he usually manages by the evening mail, or, at all events, by that of the following day, to despatch the mass of mysteries which have been so mercilessly imposed upon him.

DEAD-LETTER OFFICE.

"*Dead*" letters and "*dead*" newspapers are such as cannot be delivered to the persons to whom they are written, for one or more of the following cogent reasons:—

1st. Because they have no addresses at all.

2ndly. Because their addresses are—even to the "blind"—illegible.

3rdly. Because the persons to whom they are addressed refuse to receive them.

4thly. Because the persons to whom they are addressed cannot be found.

5thly. Because the person to whom they are addressed *is* found to be "*dead and gone.*"

The number of dead letters and dead newspapers received at the London Dead-Letter Office, from the 5th of January, 1848, to the 5th of January, 1849, with the amount of postage due thereon, was as follows:—

	Number.	Postage. £.	s.	d.
From Country postmasters and Foreign stations . . .	1,002,118	7,250	15	4
From inland carriers in London .	161,323	1,602	10	10
From London District carriers .	280,005	516	15	4
Packets allowed to the letter-carriers by the President in Packet-Book	2,925	1,311	1	7
Foreign letters neglected to be paid	30,085			
Total . .	1,476,456	10,681	3	1

Of the above letters 10,972, on being opened, were found to contain property of the value of nearly half a million, as follows:—

	£.	s.	d.
In Bills, amounting to	411,980	11	7
In Cash, Banknotes, etc.	9,569	1	5
.	421,549	13	0

Of *dead* letters, a considerable number, containing property valued in two consecutive years at upwards of £10,000, have actually been posted without any address

at all! Indeed, many years ago, a blank undirected letter, on being opened at the Dead-Letter Office in London, was found to contain in notes no less than £1500!

The only way in which this extraordinary and, at first, almost incomprehensible fact can be accounted for is, that the attention of the good lady or good gentleman, who had folded and sealed such a valuable money-letter, had hysterically been so exhausted by the desire to do both with *extreme* caution, that, under a moral syncope, there had not remained between the crown of the head and the soles of the feet strength of mind enough to enable her or him to finish the operation; in short, the neglect had proceeded from what is properly enough called "absence of mind," which we will endeavour to exemplify by the following digression, for which we humbly beg pardon:—

An over-tired Yankee, travelling in Kentucky, called at a log-hut for refreshment. A young woman, while spreading the table, gave him her infant to hold, and in a few minutes laying before him a homely meal, then modestly returned to her work. The long-backed man, enraptured at the sight of the repast, and overwhelmed by feelings of gratitude to the mother, of admiration of the lovely infant on his knee, and of extreme hunger—in a fit of absence of mind, exactly such as caused the person in England to post a letter containing £1500 without any address—to the horror of the hostess, all of a sudden . . . kissed the loaf,—buttered the child's face,—and cut its head off!—at least, so runs the story in Kentucky.

Each postmaster in the United Kingdom is required to send up to London every Monday, enclosed and addressed to "The Inspector of Dead Letters," his dead letters and newspapers, of which he forwards a monthly account, which is settled quarterly. The London inland carriers transmit their dead letters and accounts twice a week; the London district carriers, daily.

The Dead-Letter Office in London is composed of six rooms,—besides a chamber of death, exclusively occupied by the president—whose clerks, thirty-two in number, are employed for six hours a day in opening dead letters:—

1. From the London District.
2. From all parts of the United Kingdom, excepting the London District.
3. From transmarine countries.
4. Packets and letters apparently containing property. In this room one clerk is also exclusively occupied in opening letters unpaid or unstamped.

Formerly very few dead letters were returned from America to this country; but by a treaty with the United States, which came into operation on the 6th of March, 1849, the Americans being now debited with the postage of the charged letters, there have lately been transmitted to London from the United States, by one return, 24,000, and by the following return 25,000, paid and unpaid letters, which could not be delivered to the persons to whom they had been addressed.

The Dead-Letter Office in London is evidently one of

high trust and honour; and, in accordance with the principles by which it should be governed, it is a rule in this department NEVER to open a letter if it can possibly be returned to the writer without doing so. The seals of chartered companies and of noblemen are usually sufficient to effect this object; and if the public, especially men of business, would inscribe upon their seals their addresses, instead of their crests or coats-of-arms, they would, in any of the cases we have mentioned, including that of sending money in undirected envelopes, enable the inspector of the Dead-Letter Office to return them their packets, etc., *unopened.*

On the receipt of country dead letters, the first duty of the department in London is to determine whether the rural postmaster has made every possible effort to find "the party"—his reasons for not having done so being written by him on the back of the letter. This investigation having been made in vain, as soon as, in the six rooms we have mentioned, the letters have been opened, they are, if possible, returned without delay in an envelope to the senders. If containing property, they are registered, and the writers, when resident in London, are requested to call for them; if resident in the country, the document is enclosed there to the postmaster for delivery, on obtaining a receipt. Those containing no property, and for which owners cannot be found, are torn by the clerk who opened them into six or eight pieces, and then, according to an old custom, they are sold under a legal engagement that they be disposed of to paper-makers to be remanufactured.

Considering the immense importance which, through-

out the United Kingdom, is justly attached to letters addressed to living persons, or even to the dead, we must own it appeared to us that the gentlemen whose sacred duty it is to make themselves, to a certain degree, acquainted with the confidential contents of all dead letters, ought not to be the persons entrusted to destroy them, or rather (according to the old custom we have mentioned) to deliver each letter, in about half-a-dozen pieces only, to the hands of a salesman, who merely *undertakes* to destroy them. Of the newspapers, waste vouchers, and letters, sold annually by the Post-Office for about £450, not one-tenth of this money is received for the dead *letters*. For the paltry sum, therefore, of about £45 a year, the respect due by a great country to the remains of so many hundreds of thousands of dead letters is openly, and, we must add, in our opinion, unnecessarily violated.

The valuable results of the exertions of the Dead-letter Office in London will at once appear by the following statement for the year ending 5th January, 1849:—

	Number.	Postage. £.	s.	d.
Gross number and amount of letters returned to the writers . . .	626,073	663	8	11
Returned letters finally refused, or not delivered	28,546	119	15	0
Postage received in the Dead-letter Office for letters delivered from thence	...	226	10	0
Postage on Irish, Colonial, and Foreign letters returned for disposal . .	53,873	1,330	0	4
Postage of letters to be tendered at corrected addresses	45,800	905	0	3
Destroyed in ordinary course . .	number not known	7,675	18	7

Under the old system of heavy postages, the number of

rejected Valentines (all of course anonymous) that found their way into the Dead-letter Office amounted to no less than 120,000. Under the penny postage, the number of "dead valentines" has fallen to 70,000. It appears, therefore, that, at all events, as regards postage, Cupid in London is not—as he is poetically believed to be—stone-blind!

NEWSPAPERS.

We have stated that the newspapers, as fast as they are either delivered at the windows of the Post-Office or unpacked from the red mail-carts, which shortly after six o'clock begin to arrive, are lifted in white wicker basketfulls from the great double sorting-hall on the ground-floor to that suspended above it. On entering, at about half-past six, these splendid apartments—which, being beautifully lighted by the sunshine of heaven, form a striking contrast to the dark and apparently subterranean gas-smoking sorting-cavern beneath—we must confess that, although for some time we had been gazing on the ascending panniers, we were altogether astonished at suddenly finding ourselves not only in a new world, but indeed almost in a new atmosphere, of newspapers.

As in rapid succession the baskets rose from below, their contents were emptied by very powerful men upon a large table, in the middle of which, on an enormous heap—a literary mountain in labour, composed of a celestial and terrestrial conglomeration of Suns, Stars, Globes, Records, Spectators, Standards, Times, Heralds, Posts, Chronicles, Punches, Bulls, Household Words, Examin-

ers, etc.—we saw standing a stout scarlet postman, armed with a long-handled, wooden broad-hoe (such as is used in the London streets for collecting macadamized mud), with which very dexterously and violently he kept pushing the white mass from the centre to the circumference, which was surrounded by red postmen, who, as quickly as they could fill their arms, carried off these papers (each hugging about seventy) towards the sorting-tables. In doing so, they unavoidably dropped several on the floor; and thus, beneath, above, in the pigeon-holes of all the sorting-tables, as also moving about in all directions, there was to be seen that astonishing creation of English newspapers, which, like the rays of the sun, enliven and enlighten every region of the globe. On Friday evenings, the mountain is increased by above half a ton of "Sunday" publications, to be delivered in the country on Saturday.

As the processes of sorting are, generally speaking, similar to those of the letters below, we will not weary our readers by detailing them, but will merely observe that, in order to ensure the utmost attention to this public work, in which not only the British people, but the whole family of mankind are interested, it is notified on a board hung up in as nearly as possible the middle of the hall, that for every paper missent, the man who shall have made the mistake will be fined a penny, which at the end of the quarter will be divided among his comrades.

All newspapers for foreign countries, as fast as they are collected, are despatched through a zinc shoot into the "Foreign Department" below.

In arranging the multitudinous mass which remains,

one of the most important duties that the sorter has to perform is to detect any fraud on that indulgence of the Imperial Parliament which liberally allows them to circulate, even to India, postage free. Under the old system of heavy charges on letters, there were innumerable attempts to carry on an illicit correspondence by means of newspapers. Of these frauds, one of the most common was, commencing at the beginning of the first page, to underdot consecutively with ink, or to undermark, by little holes made with a pin, each letter needful to make up the several words of the fraudulent communication.

Letters, and enclosures even of wedding-cake, are still frequently concealed within newspapers; but by very ingenious means, which it would not be proper for us to reveal, they are usually detected, and, wherever it is possible, punished. The present Postmaster-General is also making strenuous exertions to suppress a species of petty larceny by which a few "household words," which many of the writers, no doubt, consider as perfectly innocent, are inscribed, sometimes openly on the envelope, and sometimes confidentially within. The following are a sample of the punishments that have been inflicted:—

For writing on the Envelope.

	Postage charged by weight. s.	d.
"With speed"	1	2
"Send soon"	1	0
"To be punctually forwarded" . . .	1	4
"With my compliments"	1	2
"It is requested that this paper be delivered without delay, otherwise a complaint will be made to head-quarters" . . .	1	0
"Postman, you be honest and true" . .	1	2

For merely writing in the Inside.

	Postage charged by weight. s.	d.
"From John" [not Lord John]	1	0
"My love to Jessy"	1	2
"My sweetest"	1	4
"All's well"	1	0
"Do come"	1	2
"One o'clock on the 10th"	0	10
"No news yet"	1	0
"Mrs. B. is suckling"	1	4

Of what strange and minute materials is the enormous revenue of the British Empire composed!

At seven minutes before a quarter to eight the newspapers, which, throughout both the upper halls, have by this time been all sorted, are, almost simultaneously, according to their destinations, packed into leather bags, a few of which are tied, sealed, and then dropped through a wooden shoot, to be conveyed at once to the termini of the several railway stations; the remainder, without being closed, at a quarter to eight precisely, are lowered in charge of scarlet postmen, *vid* the machine, into the great sorting-halls beneath. As fast as they arrive there, the letters belonging to each sack (the letter-carrier holds it open while the sorter fills it) are super-packed in strata above the newspapers, until by about three minutes to eight the bags are not only all sealed, but are to be seen, eight or ten in a lump, on the shoulders of postmen, who, appearing almost as if they would break down from the loads they are standing under, completely block up, like ladies waiting for their carriages, the passages which lead to the exeunt-door. As soon, however, as the clock, which has been attentively watching the operations,

benevolently strikes eight, the president's authoritative voice is heard from his elevated desk to utter very distinctly the monosyllable "Go!"—in obedience to which, the door flies open, the mass of white and brown bags, of scarlet cloth, red faces, and horizontal backs, moves on, and in a very few minutes the great sorting-halls above as well as below are all empty! The night scene, outside, of stuffing the bags into accelerators, often leaving therein merely room enough for the guard, is very soon concluded, and thus, by a very few minutes after eight—the last sharp exclamation of "All right! drive on!" having already died away—the whole of the letters and newspapers ejected from the Inland Department of the London Post-office are in various directions rumbling through the streets towards their respective destinations!

MORNING DELIVERY.

Our heart aches when we state, that most of those intelligent public servants whom we have but just dismissed to homes more or less poor, as well as more or less distant, to enjoy that pittance of domestic happiness and of rest, which alone, excepting on the Sabbath-day, is allowed to them, have to arise, dress, and walk to St. Martin's-le-Grand early enough to arrive there before five A.M., to arrange the morning delivery; and if, as is the case, they cheerfully, week after week, month after month, and year after year, daily assemble to perform this endless duty, our readers, as they sit reclining in their easy chairs, will not, we hope, shrink from the

fatigue of reading, for a few minutes, a very brief abstract of the manner in which their important duties are performed.

The bags reaching London from all the inland Post-offices, or in other words from all parts of the United Kingdom, as well as from abroad, are rapidly brought from the termini of the principal railways by two-wheeled mail-carts and four-wheeled accelerators (for no mail-coaches are now employed in this work) to St. Martin's-le-Grand, where they begin to arrive at five o'clock A.M. As fast as they are unloaded at the door, the large, long "roadsacks" are opened, and the "*bags*" from within these are then brought on the shoulders of red letter-carriers to twenty-four "opening tables," arranged alphabetically, so as to give to each as nearly as possible the same amount of work. A junior clerk examines the bag and seal, and if there appears to be anything wrong about either, without opening, he reports it. If however all be right, he cuts it open, and then, turning it inside out, he deposits the whole of its contents on his table.

Although all the Queen's heads in the heap have been obliterated by the different postmasters in the country, the letters have each to be examined to ascertain whether its postage by stamp or by money is correct, in which operation the clerk separates the mass as he proceeds into two divisions, "Town" and "Country"—the former usually containing about three-fourths, and the latter one-fourth. He also lays aside in one compartment the large letters and parcels.

The small letters are then, by messengers, stamped, if prepaid, on their faces, and if by postage-stamps, on their backs, with the letter of the table, day, month, and year; and in order that every operator may be made responsible for the work he undertakes, a book is stamped and signed daily by the stamping messenger, which of course not only identifies *him*, but shows whether the letter, dates, etc., he had used on his instrument were correct. As fast as the messenger, in stamping, passes the letters behind him, his satellite letter-carrier bears them off to other sorting-tables, at which "*country letters*," including foreign ones, are disposed of at one double desk, divided on either side into twelve compartments, each two feet nine inches broad, labelled in two tiers of pigeon-holes, the same as for the evening delivery. The "*large packets*" are taken to a single adjoining table containing three compartments, each of the extra breadth of four feet seven inches; the "*Town letters*" to desks divided into two tiers of seven and eight compartments each, numbering from 1 to 15, of which Nos. 1 to 13 are for "Divisions," each of which comprehends about one-thirteenth of that portion of London which lies within the three-mile circle; No. 14 for *small* letters for public offices; and No. 15 for the remaining portion of the London District lying between the three and twelve mile circles, the letters and documents for which are at once, by means of a fly-wheel and endless rope, forwarded through the tunnel from the "Inland" to the "District Office."

This first process of assortment having been concluded,

the letter-carriers next convey the whole of the thirteen London Divisions of letters to one double and one single desk, divided into forty-seven compartments, each of which is subdivided into a double row of eight bins, called "walks;" and as fast as this latter operation is effected, they are again carried off in wooden trays, constructed to be held under one arm, to the two lifting machines at each end of the hall,—within which machines the red carriers in tiers, or, geologically speaking, in strata one above another, are rapidly uplifted to the large, well-lighted double hall used at night for newspapers, where, by arrangements which we shall detail in describing the deliveries of the London District Department, the letters are finally sorted into streets by the very letter-carriers who are themselves to deliver them.

The whole of these operations throughout the halls above and below must, if possible, be concluded by seven o'clock A.M.; after which half an hour is allowed to the London letter-carriers finally to arrange and tie up their parcels for actual delivery,—and accordingly, at half-past seven precisely, they and their bags are despatched by accelerator-omnibuses, which, starting brim-full of red postmen and white bags, rapidly drop one after another at the commencement of his respective walk, until the last carrier, bag in hand, having descended from the steps, the empty vehicle veers round and slowly returns to its resting-place. Each "walk" is so constructed as to enable the postman, excepting on Mondays, to complete his delivery in about an hour, when he takes his "time-card" to the nearest receiving-house, that the name and

time may be certified thereon. The postmen's duties end generally about half-past nine, according to distance, and,—excepting seventy men reserved for the little mid-day despatches to Brighton and Southampton, and deliveries of the letters of the day-mails,—they are then their own masters until five P.M., when they again assemble for the busy and exhausting duties we have just described.

When both halls, above and below, the foreign room, and the Blind-man's chamber, are each in full and vigorous operation, the picture altogether is one which, from being composed of very odd noises, as well as very strange objects of vision, cannot be delineated by crayon or pencil. The tramping, puffing, and occasional snuffling of the carriers, as with armfulls, bagfulls, or trayfulls of letters, they proceed rapidly from one long table to another,—the reverberations of the stampers,—the fluttering or shuffling of myriads of letters into pigeon-holes,—the rumbling of the tunnel ropes and of the steam-engine,—form the everlasting musical accompaniment to which the sorters, messengers, bagmen, etc., seem to work. The floors of both the double halls appear literally swarming alive with human beings, dressed in dark clothes or in scarlet ones; and as the stranger, in mute admiration of the busy scene, suddenly observes at each end of the room, vertically moving upwards or downwards in iron cages from one floor to the other, jaded human figures in bright-red uniforms, standing bolt-upright with white letter-bags in their hands, letters under their arms, or newspapers at their feet, it

is almost impossible for him to help fancying them to be the spirits of departed postmen, who, according to their general performances, and especially according to the mode in which they may have been in the habit of handling letters containing sovereigns, half-sovereigns, shillings, and sixpences, are from the troubled interior of St. Martin's-le-Grand ascending or descending to their dooms!

MONEY-ORDER OFFICE.

Among the list of social comforts which Mr. Rowland Hill's penny postage system has conferred upon the community, may be enumerated the extension and increased facility it has afforded to the transmission of Money-Orders; an arrangement which, from its original establishment in September 1838 (when it was composed of three clerks), has now grown into a vast banking system, identical in dimensions with the United Kingdom, by which, at a very trifling charge, and with almost perfect safety, any small sum can by any person be transmitted from and to any part of England, Ireland, Scotland, Guernsey, or Jersey. The number of postmasters and receivers authorized to issue and pay money in this manner amounts to 14,487, forming altogether a series of branch banks, ready at any hour of the day to communicate with each other or with the London office for the accommodation of the public. The growth and practical utility of this department of the Post-Office may be sufficiently shown as follows:—

	£.	s.	d.
In the Quarter ending 5th April, 1839, the total amount of orders issued in England and Wales was	49,496	5	8
In the Quarter ending 5th January, 1850, they amounted to	1,830,907	17	5

The number of ledgers used at one time in 1838 was four, of 330 folios of sixty-one lines each. In 1847 it was eighty-one, of 550 folios of sixty lines each. Since 1847, by a simplification of accounts, these ledgers have been nearly got rid of. The amount paid at the money-order windows of the London office alone on the 21st January, 1850, was £4809. 3*s.* 9*d.* Average payment of the last month, about £3500 per day. The money-orders issued in London alone have increased as follows:—

	£.	s.	d.
For the Quarter ending 5th April, 1839	7,160	19	4
For the Quarter ending 5th January, 1850	263,386	9	4

Finally, it may be observed, that if the present cost of the Money-Order Office were to be deducted from the gross amount of poundages lately received for money-orders issued throughout the United Kingdom, there would remain a small profit or revenue.

The enormous business transacted in this branch of the Post-Office may be faintly exemplified by the fact, that every morning's post usually brings to the chief office in London (in which there are employed 178 clerks) no less than 12,000 advices, amounting to nearly four millions a year! The present Postmaster-General lately determined to reduce the dimensions of these advices from a semi-sheet of foolscap to about half that size, by

which act of apparent insignificant economy a saving of no less than £1100 a year has been effected, although the Government is supplied with paper at a notoriously cheap rate. By another alteration, lately effected in the *form* of the correspondence of the Money-Order department, the number of packets transmitted on that service to the inland London office has been reduced about 46,000 a week, and of course the expense and trouble of receiving, of conveying, and of sorting these letters on their arrival at the London Inland Office, have also been saved.

THE LONDON DISTRICT DEPARTMENT.

(COMMONLY CALLED THE TWOPENNY POST.)

The work of this Office is a wearing, wasting, intermittent fever, which, excepting Sundays, comes on regularly every morning throughout the year at six A.M., and which, in ten cold and hot fits of unequal severity, afflicts the various sets of patients, who are successively exposed to it, until ten minutes past nine at night.

After a night's rest, such as only the weary in this world enjoy, the first symptoms of uneasiness in this great department,—by which more letters are now delivered than, before the introduction of the Penny System, passed through all the Post-Offices of the United Kingdom,—is the arrival, at the early hour we have named, of a detachment of clerks and letter-sorters, who, in winter often paddling under umbrellas and in mackintoshes through sleet, snow, and dark wet streets, as-

semble for the purpose of receiving, but not opening, a tide of wooden boxes full of letters and newspapers from all parts of the United Kingdom, which, under the influence of machinery and of an endless chain, flow in a succession of waves from the Inland Department (commonly called the *General* Post-Office) for delivery in that portion of the London District which lies between the three and twelve mile circles. At six o'clock, the hour of the arrival of the president and his assistants, amounting altogether to ninety persons, these boxes are opened, and the contents taken out and sorted, during which operation boxes full of letters, sometimes in a stream and sometimes in a torrent, continue unceasingly to pour in through the sewer or tunnel.

While the sorting of all these letters and newspapers, in a mode we shall shortly describe, is, like the deposition of honey in the cells of a hive, going on, a number of boys and men, on foot, on horseback, or driving light carts, are, in all directions, occupied in the following curious process of *collection.*

All the letters throughout London which, if stamped or unpaid, have been dropped into the slits, or, if paid in money, have been delivered on the counters or at the windows of 259 receiving-houses by a quarter before eight A.M., are at eight o'clock conveyed through the streets in the hands or on the shoulders of letter-carriers, either to the chief Office at St. Martin's-le-Grand or to the under-mentioned eight branch offices, from whence they are conveyed to the main office in the following manner:—

From Charing-Cross, by mail-cart.
North-row, ditto.
Portland-street, ditto.
Pimlico, ditto.
Sidmouth-street, cart and riding-boy.
Shoreditch, ditto ditto.
Stepney, ditto ditto.
Southwark, riding-boy only.

After the arrival of these contributions, the whole force of the Office is employed in what is technically termed "opening collections;"* and as for this heavy amount of work only one brief hour is allowed, we will endeavour to explain the admirable arrangements by which the first great London District delivery, termed "the nine o'clock despatch," is performed.

1. As fast as the red mail-carts, ornamented with the royal arms, after whisking round the north and south angles of the Post-Office, suddenly pull up,—or rather, as soon as the poor jaded horses, *mero motu*, of their own accord, suddenly stop at the, to them, well-known entrance of the District Department,—the driver of each vehicle, throwing down his reins, and standing up in his cart *dos-à-dos* to his horse, hauls out from beneath his seat, one after another, a series of milk-white, cream-coloured, and gingerbread-coloured bags. With these thrown over his shoulders, and with his time-paper in his mouth, he without delay enters the passage, where

* The number of collections made up by the letter-receivers per day within the three-mile circle amount to 2563.

The number of collections made up by the country-receivers per day within the three-mile circle are 198.

he delivers his charge to a porter, whose duty it is to check the number of his bags.

In like manner, and at the same moment, little riding boys, each giving to his horse as he almost brushes the aforesaid corner a valedictory touch of the spur, have hardly stopped, when, leaning backwards in their saddles, they quickly unbuckle one strap, while a porter in waiting, simultaneously unloosing the other, lifts from above the panting flanks of the poor Post-Office animal a leathern valise containing the bags, which are instantly carried off into the portion of the Office appropriated to receive them. The drivers and boys deliver to the time-keeper their "time-bills," on which, in one column, appear the precise periods at which they *ought* to have started; *ought* to have called at each receiving-house in their "road" or "ride;" *ought* to have arrived: and in a second column, the hour and minute, certified by various receivers and time-keepers, at which at each station they actually *did* arrive.

2. As soon as the forefinger of that steady man of business, the Post-Office clock, points to 8.10, a gang of men, each either carrying on his declined shoulders a huge letter-bag, or hugging one in his arms, or with one or two dangling from each hand, are observed following one another through a passage into the sorting-room. Of the bags thus *collected* those containing newspapers only are taken into the great sorting-office, 96 feet 4 inches long and 71 feet broad, to a small table, 21 inches broad by 12 feet long, beneath which appear standing gaping in a row eight large white baskets,—

1 for General Post,
6 for Country Divisions,
1 for London District within the three-mile circle.

The bags containing letters and "packets" are carried to tables eighteen inches broad by five feet in length. To these tables, which are divided into very small compartments, there are appointed ten or twelve clerks, whose duty it is, on receiving each bag, first of all carefully to inspect its seal; if perfect, to cut it open, empty its motley contents on his portion of the table, and lastly, turn the bag inside out, to prevent being fined half-a-crown for any letter left within it.

3. The contents of the bags, having been thus piled in a heap before each opening-clerk, his first process is to take up and examine the "bill" of its contents, to see if there are any registered letters in the mass; if so, he selects and despatches them to the registrar-clerk, who gives a receipt for the same. He then checks the number and amount of "paid" letters, which the receivers have been required to tie up separately, to ascertain that they correspond with the number and amount in the bill. These preliminary examinations having been completed, he next separates the London letters from the Inland. The latter, without a moment's delay and without being stamped, are packed in a box and transmitted, *vid* the subterranean tunnel, to the Inland Office. All newspapers he chucks into a basket behind him, from whence they are by another clerk separated into two parcels, namely, "London" and "Country"—including transmarine. Lastly, whatever parcels termed "packets"

may appear in the heap, whether for town or country, he selects and forwards to a separate sorting-desk.

Having got rid of all newspapers, of all letters not belonging to the London District, and of all "packets," the poor creature's next operation is—with a rapidity which unless witnessed could scarcely be credited—to divide the letters which remain into two classes, "stamped and unpaid," and "paid." Each class are by him not only separated, but are placed with their faces all looking one way; and as fast as they accumulate they are carried off in armfulls to the upper end of the office, by porters, who deposit all of one sort on one double desk and the remainder on another.

4. *The stamped and unpaid letters* at the double desk, above described, are divided among eighteen sorters, by each of whom the stamped letters are simultaneously subdivided into a double tier of pigeon-hole boxes as follows:—

1. General Post. 2. Ten Town Districts; namely,—North-west, West-City, Lombard-street, North-east, East, Southwark, Portland-street, North-row, Charing-cross, Pimlico. 3. Six Country Districts; namely,—Hounslow, Barnet, Enfield, Woolwich, Croydon, Hampton.

The unpaid letters are transferred to a table two feet two inches by fourteen feet six inches long, where, after being similarly subdivided, they are stamped merely as "unpaid." *The paid letters* are transferred to a table two feet two inches broad by seventeen feet nine inches long, where they are stamped merely as "paid."

5. As fast as these operations are concluded, the letters as they accumulate are carried off to another double desk, on one side of which every *town*-letter receives, first of all, from a stamper standing sideways a violent blow on its face, which cancels its stamp, and then from another stamper, posted behind the first, another violent blow on its back, indelibly marking thereon the hour, the day of the month, and the year at which it is to be despatched. At the opposite side of the same table the whole of the *country* letters are in like manner doubly belaboured by two stamp-obliterators and two date-markers.

6. The whole of the letters having been thus examined, sorted into districts, and stamped, their next migration is into a large airy, well-lighted room, called the Letter-carriers' Office, where they are distributed among fifty-seven letter-carriers in *blue* uniform coats with red collars, seated about two feet four inches asunder, at double desks.

About two-thirds of the London letters are divided among these intelligent men, who rapidly sort them into "walks;" the remaining one-third are deposited on one long double desk, to be carefully examined, previous to their being despatched to Charing-cross and to the other principal receiving-houses—where, for the object of relieving the main office in St. Martin's-le-Grand, they are sorted into walks by the blue-coated postmen who subsequently actually deliver them at the houses to which they are addressed.

At the principal receiving-houses of each of the nine-

teen stations within the three-mile circle, as also of the fifty-three stations between the three and the twelve-mile circle, there is established a room in which the letter-carriers assemble to receive and finally to prepare their letters for delivery, by arranging them, not only in streets, but consecutively in the numbers thereof. To each of these districts there is also appointed a "charge-taker," whose duty it is to attend to the accounts, and who, therefore, is charged with the postage on all unpaid letters. The wages of the letter-carriers are from 20*s.* to 25*s.* a week; those acting as charge-takers receiving an additional allowance of 3*s.* The letter-carriers are usually employed from nine to ten hours per day; the number of miles they walk per day averages from fifteen to twenty-four.

The "*country letters*," at six tables, each about eighteen feet long, are similarly sorted by *clerks* into "roads," formerly called "rides," and are then packed into canvas or leathern bags. Three minutes only before the period at which these bags are despatched, the boys and drivers who are to convey them are called in to assist in tying up their mouths, which are no sooner sealed with red flaming wax by the stampers, than each driver and boy, like an ant carrying a grain of corn, hurries off with his burden to his mail-cart or horse. The driver packs his own cart; the boy, nimbly hopping into his saddle, and leaning backwards, as before described, is assisted by the porter, who, if he can manage to buckle the right strap of the valise quicker than the flibbertigibbet he is waiting on can fasten the left one,

exclaims gruffly, "Look *sharp!*"—which convulsively affecting the child's spur, away the poor horse starts. The drivers in their red carts soon follow; and in a few seconds, cleverly worming their way through the variety of two-wheeled and four-wheeled obstacles that obstruct them, all are to be seen strenuously radiating to their respective destinations.—The number of horses daily employed in this manner by the District Department alone is 150. The rate at which they go may be exemplified by the single instance, that twelve minutes only are allowed from the General Post-office to Charing-cross.—The interesting operation, or rather the series of operations, which we have endeavoured to sketch, is, excepting Sundays, repeated during the day, for *ten* "town" deliveries; *seven* beyond the town and within the three-mile circle; *five* within the three and six mile circles; *three* within the six and twelve mile circles. Accordingly during upwards of fifteen hours out of the twenty-four, the interior of the London District office exhibits a succession of labour of a very exhausting description; while beyond its walls, in darkness and in daylight, exposed to every sort of weather, a brigade of men, of boys, and of poor horses, are to be seen, vibrating, with short intervals of rest, between St. Martin's-le-Grand and their respective stations.

In the rear of the London Post-Office we observed a small narrow stable, into which in rainy weather are stuffed, on the principle of first come first served, seventeen or eighteen horses—the remainder having to seek for shelter elsewhere. The drivers and boys are selected

for their duties by a steady middle-aged man whose duty has been for many years to watch their departures and arrivals, and who very naturally having lost his voice in such an inclement service, utters his valedictions as well as his maledictions in a tone, as nearly as possible, half-way between a whisper and a bark. The riding-boys are mostly from thirteen to sixteen years of age; "after which," our professional adviser hoarsely informed us, "they mostly grows into drivers." In outline of stomach, they are, every one of them, apparently of the French pig or greyhound breed; and their clear complexions also indicate high condition and joyous health. Among a group of them we particularly noticed Richard Martin, who, we were half-softly and half-gruffly informed by his "*governor,*" is not only the best rider, but, in conduct, the best boy in the service. A more agreeable specimen of the English countenance, and indeed of the unassuming character of a mild bold English boy, could scarcely be met with. Ever since this little fellow was eleven years and a half old, he has been riding on her Majesty's service for six days in the week—beginning at a quarter before eight and ending at half-past seven—thirty-five measured miles per day! He has done this for two years and a half continually, with the exception of one week only, when he was sick. His journey is from the Post-Office to Shoreditch Church and back; and, in spite of carts, carriages, cabs, *busses,* etc., he has performed it regularly ten times a day. To storms of wind, rain, snow, and sleet, in daylight as well as in darkness, he must, of course, have been occa-

sionally exposed; but his greatest trouble, and indeed danger, have proceeded from the slippery state of his road in frosty and in what he termed to us "greasy" weather. As the poor boy has no father, and as his mother is a charwoman, it is of course almost impossible to hurt him: yet he told us very artlessly that in bad weather his horse had repeatedly slipped up with him, as often as three or four times a week; but, as Sam Weller has very justly observed, "*Who ever knowed a churchyard vere there was a postboy's tombstone, or ever seed a dead postboy!*"

On the Queen's birthday these riding-boys receive a hat with a fine gold band and cockade, a bright scarlet jacket, a beautiful blue waistcoat, and—just as if Joseph Hume had then suddenly clasped them round the waist—nothing more! We should be sorry to implant in their light hearts a seed of discontent; yet, when we reflected on the everlasting bumping work they have to perform, we must own that, from a very slight experience in such matters, it occurred to us that her Majesty's Postmaster-General,* who not improbably knows some of the uses to which buckskin can be applied, might surely take an opportunity of explaining in respectful, appropriate, but in most pathetic terms, that these fine little boys, who convey the correspondence of the commercial metropolis of the world, are unscientifically covered at *the wrong end;* that it would be more creditable to a great nation to clothe them all over; and that at all

* Lord Clanricarde, one of the best riders that ever crossed Leicestershire.

events it would be infinitely more agreeable to them to

"Go with their HEADS bare
Because they 've got no hats to wear,"

than, as at present, the contrary.

REVENUE.

The early origin of the English Post-Office is involved in obscurity almost amounting to total darkness, and therefore—without endeavouring to detail in what manner, by what exertions, and at what rate the happy few who could read and write managed, like flies crawling across a treacled plate, to communicate with each other over pathless tracks or through miry roads, that offered to the transmission of a bag of letters greater physical difficulties in a few hundred miles than are now encountered in its transit across the Atlantic, or even in its passage to Bombay—we will merely refer our readers to the following advertisement, by which it appears that letters which now weigh as nearly as possible three tons, and which at present are conveyed at a speed of from thirty to forty miles an hour, were only seventy years ago packed into the valise of a single post-boy, whose average progress was about three miles and a half per hour.

"*General Post-Office, Feb.* 22, 1779.

"The Post-boy carrying the Mail which was despatched from this Office last Friday night, was robbed by two foot-pads with crapes over their faces, on Saturday night at ten o'clock, at the bottom of Hack Lane, near Long Compton,

between Enstone and Shipstone, in Oxfordshire, of the whole Mail, containing the following bags, viz.—

Warwick,	Knutsford,	Bridgenorth,
Stratford-on-Avon,	Manchester,	Stafford,
Shipston-on-Stour,	Stockport,	Shiffnal,
Ledbury,	Liverpool,	Nantwich,
Hereford,	Warrington,	Chester,
Broomsgrove,	Wigan,	Northop,
Worcester,	Preston,	Conway,
Stone,	Blackburn,	St. Asaph,
Newcastle-under-Lyne,	Lancaster,	Bangor,
Macclesfield,	Kendal,	Holyhead and the
Middlewich,	Wolverhampton,	Irish Mail.
Holms Chapel,	Shrewsbury,	

"The persons who committed this robbery were small-sized men, but it being a dark, foggy night, the boy cannot give any further description of them.

"Whoever shall apprehend and convict, or cause to be apprehended and convicted, both or either of the persons who committed this robbery, will be entitled to a reward of Two Hundred Pounds over and above the reward given by Act of Parliament for apprehending highwaymen.

"By command of the Postmaster-General,
"ANTONY TODD, *Secretary.*"

What a contrast the above forms with the fact, that by the night-mail only there are occasionally despatched from the Metropolis on one arterial line—the London and North-Western Railway—the contents of ten Post-Office four-wheeled accelerators full of letters and newspapers!

As in the United States of America it has been wisely established by law, that the whole of the moneys col-

lected by the Post-Office shall be spent on that department, so not only by the 12th of Charles II. was it declared that the Post-Office was established "for the advantage of trade and commerce," but the enlightened principle was recognized in the preambles of the different Postage Acts from the Commonwealth to the 10th of Queen Anne, when the English and Scottish Post-Offices were united. The receipts of the department having, however, soon exceeded its expenses, there remained, in the form of balance or revenue, a species of forbidden fruit, so delightful to the touch and taste, that it was allowed, unobserved and unobjected to, to roll of its own accord into the capacious hands of the Chancellor of the Exchequer, whose fiscal appetite having been, naturally enough, highly excited thereby, it was soon resolved to inflict upon the unreflecting public a series of increased postages, which eventually, in some instances, exceeded the mere cost of transit of the chargeable letters in the proportion of 135 to 1!

This reversion of the principle on which the Post-Office had originally been founded, produced in 1838 the following extraordinary results:—

1. Of every ton of documents that were transmitted by post, rather less than four hundredweight were saddled with the expenses of the collection, transmission, and delivery of rather more than sixteen hundredweight of letters and papers gifted with the privilege of going free, or rather of luxuriously travelling at the expense of the small portion of chargeable letters.

2. Upon the chargeable letters only there was, more-

over, inflicted a tax in the shape of profit or revenue, amounting in 1838 to £1,613,895. 15*s.* 7¾*d.*!

3. Thus, upon letters from Edinburgh to London, which in an ordinary parcel could, it has been ascertained, have been transmitted for one-tenth of a penny each, there was exacted a postage of no less than 13½*d.*

4. Although throughout the continent of Europe postage was universally regulated by weight alone, the British Post-office, not satisfied with its exorbitant rates, had arbitrarily and most unreasonably further decreed, that every letter (though not exceeding in weight a single one) which, for the correction of the press, for mercantile, or for any other object, had been cut into two or three pieces, should respectively be charged double or treble postage; and thus, if two pieces of silver paper, each only half the size of a banknote, were enclosed in an ordinary envelope, for the whole (weighing only one quarter as much as a thick post single letter), triple postage, namely 3*s.* 4½*d.*, was exacted!!

As the postage of every chargeable letter averaged throughout the United Kingdom 6½*d.*, one-third of a poor man's daily income, and as it has been truly observed that such a charge to *him* was about equal to that of a sovereign to a gentleman enjoying £1000 a year, it need hardly be said that the letter tax must have had the effect of very nearly totally suppressing all communication through the Post-Office between the working classes of society: indeed, nothing can be more affecting than the evidence given before the Select Committee of the House of Commons in 1838, showing the utter inability,

for instance, of a poor mother to purchase from the hands of her village postmaster a letter addressed to her by an absent child, withheld from her, not for *its own* expenses alone, but to liquidate a portion of the expenses of a letter franked to her rich neighbour, her lord and master! nay, moreover, to pay perhaps in form of revenue a portion of the public salary or pension he was enjoying!

The suppression however of the correspondence of the poor, being of a negative or invisible nature, would probably never have been noticed, had not the attention of the public, by Mr. Rowland Hill's pamphlet, been first attracted, then fixed, and finally riveted to the alarming fact that, although during the years 1815 to 1835 the population of the country had advanced 30 per cent.; although the country had prospered; although trade had increased: although the education of the people had extended; although the stage-coach duty had increased 128 per cent.; although in the United States of America the gross revenue of the Post-Office had trebled (that of France in only fourteen years having increased 54 per cent.);—the net revenues of the *British* Post-office had not advanced! In short, it was undeniably proved that our reckless rates of Postage, creating their own antidote, had established throughout the United Kingdom a contraband and illicit traffic in letters, in which not only almost every public carriage, every steamboat, and every carrier was vigorously implicated, but in which people of all ranks and classes were found to be engaged; Mr. Cobden unhesitatingly stated that

five-sixths of the letters from Manchester to London went otherwise than by Post. Indeed, in one mercantile house, the proportion of smuggled letters, as compared with those on which regular postage had been paid, was proved to have been in the proportion of 67 to 1! In short the nation, at first secretly, and latterly almost without disguise, had rebelled against the unwholesome, withering exactions of the Post-Office, truly stigmatized before the Select Committee of the House of Commons by one of the principal smugglers "as a most iniquitous tax on the affections and morals of the people; upon every social good, and upon everything that, among a people in a progressive state of civilization, it is desirable to cultivate; a tax upon knowledge, on science, on literature; a tax upon correspondence; a tax upon speech; a tax upon speaking and hearing." "The worst of our taxes," indignantly observed Lord Ashburton; "you might as well," added his Lordship, "tax words spoken on the Royal Exchange, as the communication between persons living in Manchester, Liverpool, and London." "A tax," said another witness, "not only on the thoughts and affections, but which shuts the floodgates of knowledge."

The evils of the Old System having been most clearly laid open and exposed, her Majesty's Government and Parliament, by one of those vigorous measures of emancipation which, to the astonishment of the world, occasionally characterize the aroused energy of the British nation, ordained a new system, by which, almost at a blow, the rates of English Postage, from being the

heaviest became the *lightest* on the surface of the globe! The expenses of at once carrying into effect extensive arrangements, unavoidably hampered by inadequate buildings and by other unelastic pre-arrangements which it would have been extremely difficult as well as costly to have suddenly dispensed with, have, as is usual in such estimates, proved considerably greater than was anticipated. As far however as the gross revenue, even in money, of the Post-Office is concerned, the triumph of an enlightened high-minded policy over erroneous short-sighted principles has been complete; indeed, it appears by returns which will shortly be laid before Parliament, that for the year ending 5th of January last, the gross receipts under the Penny System, which since its introduction have steadily increased, have already amounted to £2,165,349. 17*s.* 9¼*d.*, being only £174,388. 0*s.* 6*d.* less than the gross revenue for the year ending 5th of January, 1838. Now Mr. Macaulay, in his 'History of England,' states that on the accession of William III., the revenue of the United Kingdom was about two millions per annum,—about £165,000 *less* than was last year collected, principally in pennies, by our Post-Office alone; and we may add that such has been the astonishing increase of wealth of the British people, that the gross receipts of the London and North-Western Railway Company for last year (£2,227,242) were also larger than the whole revenue of the British Crown in year 1689!

But as the *numbers* of letters conveyed by post in the years ending 5th of January, 1838 and 1850, have in-

creased from seventy-six millions to three hundred and thirty-seven millions, it is evident that, to the gross postal receipt for the latter year, there remains to be added the enormous increase of revenue which the Exchequer must have indirectly received from the excitement given to trade, commerce, and manufactures, by the easy transmission under the penny system of every description of letters of advice, remittance, printed circulars, patterns, samples,—in short, of every communication that can stimulate exertion, encourage emulation, or reward industry. The increase of business thus created may be briefly exemplified by the single fact that Messrs. Pickford's correspondence, which, oppressed by heavy postages, was restrained in 1839 to 30,000 letters, increased in 1843 to 240,000 letters!

But besides the fiscal receipts of the new cheap postage system, how are we adequately to appreciate the inestimable *moral* revenue it is producing, and which every year must inevitably increase?

We will not pause to endeavour to estimate the exact value of the enjoyment which the rich receive by being enabled not only to negotiate their business, but to transmit their ideas, be they good, bad, or indifferent, to any part of the United Kingdom for a penny; but we beg our readers to join with us in reflecting on the blessing which the middle classes, and most especially the poorest, derive by being suddenly relieved from a tax on their affections which had not only prevented them from communicating with their absent friends, but which must have disheartened them from even learning to

do so; for on the husbandman's homely principle, that it is useless to sow that which can never be reaped, what right have we to affect astonishment at the English peasant having been—as he indisputably still is—the most illiterate in Europe, when we consider that he has only lately been relieved from the following penalties?—

	d.
For every letter addressed by him to his absent parents, brothers, sisters, or friends, in addition to all expenses of postage, a fine averaging	5
For every such letter put into an envelope, though the whole was within the weight of a single letter, an extra fine of	6
For enclosing in the aforesaid letter to his mother, a short, carefully pasted-up note, "For Sarah," the whole being within the weight of a single letter, an additional fine of	6

Into the details of the revenue of the Post-Office we have neither space nor inclination to enter: we will therefore merely observe that, throwing upon the letters the whole of the United Kingdom the cost of the collection, despatch, conveyance, and delivery of newspapers (which are about double the weight of the letters), the postage of one penny on a single letter may be divided very nearly as follows:—

	d.
Profit, or revenue, rather more than . . .	$\frac{1}{3}$
Cost of conveyance, nearly	$\frac{1}{3}$
Cost of receipt and delivery (of which the latter exceeds the former in the proportion of about 2 to 1)	$\frac{1}{3}$

BRITISH POSTAL SYSTEM.

Having concluded our slight sketch of the interior of the London Office, we will now endeavour to delineate the few leading principles upon which the transmission of the correspondence of Great Britain, under the uniform penny postage system, appears to be regulated.

The daily arrival and despatch of about a million of letters and newspapers from and to not only all parts of the United Kingdom, but all portions of the globe, as at present arranged, somewhat resembles the arterial and venous circulation of the human system.

From London—the heart of the commercial world—letters, newspapers, and packets, by two great pulsations, the one between nine and ten A.M. and the other at precisely eight P.M., are, under the arrangements we have described, diurnally projected along six arterial railways to about 600 principal towns, at most of which there are "forward offices," for despatching, sometimes without opening them, all bags addressed by the London department to remoter points. As our correspondence—the blood of the country—is rapidly flowing along these six lines, it repeatedly, mechanically by turn-tables, but apparently of its own accord, branches away at diminished speed, and at angles more or less acute, upon other rails; and when each of these iron ways has come to an end, it continues at a still slower rate, by an infinity of ramifications, to progress upon high-roads—then upon bye-roads—and eventually to meander upon paths,—until not only every inland letter forwarded from the Metro-

polis to 8000 provincial post-offices has, at foot-pace, been delivered to the person to whom it was addressed, but every foreign document also is at its port ready to be forwarded by steam-packets, by sailing-packets, by vessels of almost every description, to its transmarine destination.

In this arterial circulation, the projecting or centrifugal power, like that which at this moment is working within us, diminishes in proportion to its distance from the heart or centre of action. At each of the London termini there is in readiness for the conveyance of every morning or evening mail at least one noble steam-engine of invincible power, fresh as a bridegroom from his chamber, rejoicing like a giant to run his course; or, in more appropriate terms, smoking and hissing, all ready, at the waving of a tiny flag, to whistle and be off. On the branch railways are also in waiting a similar set of engines, but of weaker power. On the high-roads the letter-bags are forwarded occasionally in four-horse coaches, then in pair-horse "busses;" as they progress, many are transferred to a one-horse mail-cart, then to postilions on horseback, then to men who carry them over their shoulders on foot;—in one instance to a red wheelbarrow ornamented with the royal arms. On approaching the extremities they are finally carried up lanes, along paths, across meadows, through streets or alleys, and into courts by postmen or post-women, until the projecting power has absolutely dwindled from the magnificent London steam-engine into a little ragged, rosy-faced boy—"*If you please, mum, here's a* LETTER *for you!*"

In the venous progress of letters and documents *towards* London, the propelling power in like manner, although inversely, *mobilitate viget viresquè acquirit eundo—increases* as it proceeds; but as all foreign mails, instead of being allowed to accumulate, are despatched to the Metropolis as fast as they arrive, and as the great flood of newspapers is *out* of London, the pulsations, from being more frequent, are proportionally of a smaller amount.

The main principle of the circulation of British correspondence between the Metropolis and the remotest regions of the globe having been thus arranged, the next great object for consideration was, at what hours the two great pulsations from London should take place. If economy only had been consulted, the mails would ALL have been ejected from London by *day;* for as the public prefer to travel at that time, and indeed, except in cases of emergency, generally speaking, now decline to do so by night, it would evidently have been necessary (as indeed is the case) to pay the railway companies four or five times as much for the conveyance of mails by night as by day; for it is obvious that—although in a long, well-remunerating passenger-train a railway company could, in sunshine, afford to convey a tender-full of letter-bags for a trifling sum;—to do so in an almost *empty* train, by moonlight, an indemnification apparently exorbitant might, after all, leave the company losers by the impressment. The great object, however, of a post-office is to do as much of its work as is possible while the nation is fast asleep, or, in other words, to *begin* its

work as soon as men of business have *ended* theirs. Accordingly, of all the documents that leave London daily, about two-thirds, regardless of the extra expense, are despatched by *night* mails and about one-third by morning ones: and we may here observe that the invention of railways has not only enabled the Post-Office thus to propel from London a bulk of correspondence, etc., which would have altogether overwhelmed the tiny receptacles of our mail-coaches, but by propelling these letters in the same time over an infinitely greater extent, it has in fact enabled the department to do a much larger proportion of its work in darkness. For instance, the night mails now reach Carlisle at nearly the same hour (in depth of winter about daylight) as under the old, slow, gouty, horn-blowing system of 1838 they used to arrive only at Birmingham. Indeed, as far as correspondence is concerned, it might almost be said that the communication between London and the radius of Carlisle is equal to that by electric telegraph; for though it consumes more time, yet, the nation being sound asleep, it is, practically speaking, time of no value.

It will be evident to our readers that in this diurnal ebbing and flowing system, by which all the secret thoughts, feelings, and affections of the British people are safely, quickly, and confidentially imparted to each other, the pulsations of London must necessarily affect the whole of those simultaneous but *transverse* transmissions of letters throughout the country by cross mails, commonly called "cross posts;" for as a main object of these subsidiary arrangements is to convey letter-bags

from all points to the arterial railways, it is of course necessary that their arrival at the various stations thereon should, in point of time, be so arranged as to correspond with the passage up or down of the mails and trains with which they are respectively to proceed; and yet, self-evident as is this necessity, a portion of the public have, in several instances, considered themselves as cruelly aggrieved, because the Postmaster-General, notwithstanding their numerously-signed petitions, has declined to order the rural postmasters to despatch their bags at hours which, though undeniably more convenient to particular localities, would disturb a carefully organized circulation of vital importance, in which the smallest obstruction or hurry would produce very serious results.

But, very unwillingly, we must now briefly notice a series of petitions of much graver importance.

SUSPENSION OF THE DELIVERY AND TRANSMISSION OF LETTERS ON SUNDAY.

We need not, we trust, affirm that we belong to that large portion of the community who, on mature reflection, desire openly as well as inwardly, publicly as well as privately, to obey those few commandments of our Creator by which, for our happiness and welfare here and hereafter, our passions are regulated rather than restrained; and as regards the particular law in question, its wisdom, as well as its beneficence, has lately been so curiously demonstrated under such striking circum-

stances, that we cannot refrain from alluding to the case.

In a little volume entitled 'Four Months among the Goldfinders in Alta California, by J. Tyrwhitt Brooks, M.D.,' the author, after describing very graphically the manner in which lawless adventurers from all parts of the world were recklessly, and in many instances murderously, engaged in the attainment of gold, states:—

"4th June.—Breakfast was soon despatched, and the question as to the day's operations asked. Don Luis was the only one who, on the score of its being *Sunday*, would not go to the diggings. He had no objection to amuse himself on Sunday, but he would not *work*. To get over the difficulty, we agreed to go on the principle of every man keeping his own findings, our bonds of unity as a party to extend merely to mutual protection and defence. Leaving Don Luis, then, smoking in the tent, we proceeded to work, and found that the great majority of the goldfinders appeared to entertain our opinions, or at all events to imitate our practice, as to labouring on the *Sunday*. . . I worked hard, as indeed we all did." —pp. 59, 60.

Now, although it appears that Dr. Brooks or his associates felt not the slightest remorse at the agreement they had entered into to desecrate, for the sake of gold, the Sabbath; yet, in the brief space of three weeks, the Doctor makes the following very remarkable entry in his journal:—

"25th June, Sunday.—We have all of us given over working on Sundays, as *we found* the toil on six successive days *quite hard enough*. . . . A few of the miners pursued their avocations on the Sunday, but the majority devoted the day

to rest, smoking, and sleeping in the shade alternately."—pp. 82, 102.

Thus, even in picking up gold (an occupation so exciting that it had burst the bands of almost all human compacts, people of all conditions having deserted from their engagements to rush to "the diggings"), one day's rest out of seven was practically found to be absolutely necessary. "The fact is," preaches J. T. Brooks, M.D., as soon as he became dead tired of working without intermission,

("When the Devil grew sick, the Devil a monk would be")

"The fact is, the human frame will not stand, and was never intended to stand, a course of incessant toil."

Accordingly one holiday per week was not only agreed on, but it was moreover carried, *nem. con.*, that they might just as well have it on *Sunday* as on any other day; and thus, from no sense of religion, did the worshippers of "the diggings" most powerfully subscribe to the wisdom of that commandment which, with modifications elsewhere explained in the Holy Scriptures, has beneficently desired us TO KEEP HOLY THE SABBATH DAY.

In accordance therefore with this precept, some time ago the Postmaster-General determined, notwithstanding the enormous increase of work, to make every arrangement that was practicable for *reducing* the amount of postal labour on Sunday,—and step by step the following alterations were effected.—On the 7th of January, 1849, the money-order Sunday business was finally suspended throughout England and Wales—thus sud-

denly relieving 450 provincial post-offices.—On the 1st of April, 1849, the suspension of the money-order Sunday business was extended to Ireland and Scotland—thus relieving 234 additional offices.—On the 28th of October, 1849, the provincial post-offices throughout England and Wales were not only as a general rule closed on Sunday from ten to five, but their deliveries on that day were restricted to *one*.. By these measures 508 provincial post-offices and 4000 dependent offices were closed for about three additional hours. In 194 post towns, 233 deliveries were discontinued, and 368 letter-carriers relieved of 1½ hour each of Sunday duty. —On the 29th of December, 1849, in the suburbs of London, beyond the three-mile circle, the early Sunday delivery was transferred to a very late delivery on Saturday night, by which 191 persons were entirely relieved from Sunday duty.—On the 13th of January, 1850, in the provincial post-offices throughout England and Wales, further extensive relief was given;—1st, by the discontinuance of a large number of Sunday mails;—2nd, by the disuse of money prepayments for all inland letters; by which restrictions 576 provincial post-offices and about 4000 dependent offices were closed on an average for four additional hours.—The combined effect of these several measures has been to relieve every Sunday upwards of 6000 persons, on an average, more than five and a half hours each. Other alterations, effecting a still further reduction of labour on Sunday, are in contemplation.

On the other hand, it was determined, in deference

to the recommendations of various commissions of inquiry, to remedy a grievance which had long been complained of as highly prejudicial to commerce, as well as to the revenue of the Post-Office, and which had been peculiarly vexatious whenever it included a mail just arrived from the East or West Indies; namely the detention in London, not only during the whole of Sunday, but often during thirty-six hours, of what, though *called* "forward" letters, were not forwarded; by which want of proper arrangements, if a man living twenty miles on one side of London had occasion, after the despatch of Friday's post, to communicate with his son residing only twenty miles beyond London, he could not, in many places, receive a reply until Thursday morning! To correct this serious inconvenience, a small temporary addition—which has ended in a *permanent* reduction of thirteen persons—was made to the Inland Department of the London Post-Office; and yet, without reflecting for a moment on the balance of the alterations, by which Sunday labour had on the whole been throughout the country so materially reduced, an excitement was created and an outcry raised, in consequence whereof petitions—in many instances, we regret to say, signed in utter ignorance of the subject—have poured into both Houses of Parliament,—1st, for no *delivery* or *despatch* of letters on Sunday; and 2ndly, for A TOTAL STOPPAGE of all mail conveyance on that day!!.

Now, of the 400,000 respectable, well-meaning persons who have affixed their signatures to this prayer for summarily destroying a piece of mechanism as scientifically

planned and as carefully put together as one of Arnold's chronometers, what proportion, it may be asked, have a clear idea, or any idea at all, of the general requirements of the British Postal System, of its political, fiscal, and commercial importance, of the arterial and venous circulation by which it breathes, or of the innumerable organized moving particles or animalcula of which it is composed? Have the majority of the petitioners—some of whom may possibly belong to that large class of the community who, to say the least, have seldom occasion to write or read letters—a superficial idea, or any idea at all, of the meaning of "the correspondence" of, for instance, our Manchester, Liverpool, Glasgow, or London merchants? Are they aware of the heavy losses that even the revenue of the kingdom might sustain by great mercantile and manufacturing houses being unable on Monday, previous to the sailing of steam-packets or of their own vessels, to receive the latest possible communications from all parts of the country? Have they considered the confusion that would be created in rival towns of the same trade from the contents of East or West India mails being communicated to some, and on the striking of the clock on Saturday night, cut off from the rest? In case of an extensive robbery of banknotes or bills, in cases of forgery, or even of bankruptcy, in cases involving life and death, and of an infinity of other private business of extreme importance, have they reflected on the serious and cruel consequences that might arise from Parliament irrationally ordaining,—1st, that it is illegal to send letters otherwise than by post;

and 2ndly, that by post they shall NOT be transmitted? Again, have they considered the inconvenience the inhabitants of, say the whole of England, would suffer from being forcibly restrained from despatching letters on Saturday on account of London's Sabbath, and on the following day because that is their own? Again, of the losses and vexations which upwards of two millions of persons congregated, principally for the transaction of business, in London, the shops of which have been closed the whole of Sunday, would sustain, from being on Monday morning debarred receiving letters from beyond a given radius, although some of them may have been posted on Friday? In short, have they calculated the sum-total of the results of a decree from Parliament ordaining that in almost every city, town, village, hamlet, and habitation throughout the kingdom there should be two or more blank postal days per week, the one for the Sabbath of the locality, and the other for those of places more or less remote?

In a calm analysis of this most important question, it is proper to consider that, under the old postal system, there existed many revolting circumstances which the power of steam has either alleviated or completely removed. For instance: while the nation were, generally speaking, keeping holy the Sabbath-day,—while the community, decently dressed, on foot, through streets, along roads and paths, or across fields, were converging or diverging to or from their respective churches,—the decorum of the scene was but too often disturbed by the sudden appearance, dust, clatter, and excitement of a

noisy, blustering mail-coach, selecting, as if in open defiance of the Fourth Commandment, as its chirruping course, the most public roads, the broadest and wealthiest streets, the very market-place,—in short, every point in the country of the greatest importance. We will not attempt to estimate the number of coachmen, guards, innkeepers, and ostlers—all, more or less red in the face—who openly attended upon this system; but we cannot take leave of it without reminding our readers of the cruel sufferings of thousands of our noblest horses, that, harnessed to a vehicle ornamented with the royal arms, before a community hardened to the crime, were driven —and, occasionally, alas! even on Sunday, were literally whipped—to death!

Now, under the present system—however imperfect we may declare it to be—the picture is, at all events, a very different one. Under the influence of a gaseous, invisible, inanimate power, which the engineer, only when requisite, lets loose, to vanish into the air, a passenger-train, to the extremity of which is attached a tender for the reception of mails, unguided by any human being, mysteriously flies—sometimes above ground, and sometimes beneath it—along an iron track appropriated by Parliament to its exclusive use,—a path which not only purposely avoids intruding into cities, or towns, or on great thoroughfares, but upon which no subject of the realm, even in his way to church, is allowed to trespass. In the transit of these mail-trains—which, at great extra expense, have been arranged to travel, as much as practicable, in utter darkness, or, as we have already explained,

while the nation is fast asleep—no animal suffers. Indeed, the loose horse, as the fiery engine rapidly glides past him, might, at all events, most thankfully BLESS its progress.—And now, what is it that 400,000 well-intentioned people, out of a population of some thirty millions, propose?

Why, that as soon as the clock strikes twelve on Saturday night, there should—just as the peasant uncarts a load of manure in the middle of a ploughed field—be ejected from this train, flying inoffensively on its own secluded rails, not the passengers—not even the petitioners—but, as if in mockery of *their* progress, a heap of brown and white letter-bags, containing the correspondence—that is to say, the conglomerated thoughts, sentiments, opinions, doubts, hopes, fears, affections, ay, and the loves, which British men, women, and children of all classes have ambitiously, self-interestedly, or innocently communicated to each other; all of which are, as in a cesspool, to lie stagnant for at least twenty-four hours.

Without referring to extraordinary political emergencies, such as those which caused the battles of Aboukir, Delhi, Vimiera, Ciudad Rodrigo, the Pyrenees, Orthes, Toulouse, New Orleans, and Waterloo to be fought on a Sunday, and without the slightest desire to impute to any party extreme opinions, it is clearly evident that if no work *whatever* is to be done on the Sabbath; if on that day no cows are to be milked; no horses, domestic animals, or poultry fed; no sentinel to pace before public stores, no policeman to watch over the lives and properties of the Queen's subjects; no fire-engines to be

used, no street-lamps to be lighted, no main water-pipes turned on; no one to be permitted to guide off the sewerage of great cities; and lastly, if the public should determine on no account whatever to ride, drive, or travel;—it would THEN be highly proper that mail-bags of all colours should everywhere be stopped in their progress to join in the general system; but inasmuch as it is undeniably more wicked for mankind to move and journey on Sunday than for the opinions, etc. *they recorded, sealed up, and posted on Saturday* to do so, it certainly does appear that for the attainment of their praiseworthy object the petitioners might have made a more judicious selection. For instance, have the 400,000 persons who have petitioned for a total stoppage of the transmission of the letter-bags of this country on Sunday, considered what contribution they themselves could offer to the holy object they desire to attain? Have they considered, or rather—discarding opinions for figures—have they calculated, that, by "a total stoppage" of "all manner of work" in their houses, it is in their own power at once to relieve "their men-servants or their maid-servants" from the manual labour of making on every Sabbath-day 400,000 beds, of dusting say 1,200,000 rooms, of lighting say 800,000 fires, of preparing 1,200,000 hot meals, of fetching, spreading, and removing at least 8,500,000 cups, saucers, plates, dishes, knives, forks, spoons, water-bottles, jugs, and mugs? Again, have they reflected that the time necessary for sorting the letters (the desecration of which they so strenuously complain) does not, in the majority of small

post-towns, exceed on Sunday that which their own servants on the same day expend in making for each of them say a plain batter-pudding? And yet, though they see no harm whatever in *finishing* their dinner by swallowing the latter, they scrupulously strain at the continuance of the former description of work. In short, they grant indulgences to their own *bodies* which they deny to the nation's MIND!

We might carry these questions much further, but we prefer briefly to submit to our readers' graver observations on the subject. It appears from papers laid before Parliament that her Majesty's Postmaster-General, besides the very great reductions in Sunday labour which he has already effected, is of opinion that no valid objection exists to totally suspending the delivery and collection of letters on Sunday in any place where the inhabitants concur in the desire to make the necessary sacrifices of their own convenience for that purpose. In addition to the above, we trust that, in deference to the general desire of the community to revere the Sabbath, he will continue by every effort in his power, and especially by the application of machinery (which in several cases might advantageously be adopted), to diminish Sunday labour to the *utmost* limits which the vital interests of the community can practically bear. Taking, however, into serious consideration the *religious* and moral evil of wilfully re-establishing throughout the United Kingdom *on every Sunday* that organized system of smuggling letters which the Penny Postage abolished as to the whole week, but which, in the opinion of all practical

men, would inevitably be the result of our mail-bags not being allowed to continue to accompany passenger-trains, we are of opinion that Parliament will act wisely by continuing to entrust so complicated a question as the postal circulation of the correspondence of Great Britain to the care of the officer of State especially appointed to watch over it.

Since the preceding sentences were put into type, it has been moved in the House of Commons, and by a majority of 93 to 68 has just been carried (June 3):—

"That a humble address be presented to Her Majesty, representing the great desire which exists in all parts of the United Kingdom for an extension of that rest on the Lord's Day which is afforded in the London Post-Office to the post-offices of the provincial towns, and praying that Her Majesty will be graciously pleased to direct that the collection and delivery of letters shall in future entirely cease on Sunday in all parts of the kingdom; and also, that Her Majesty will cause an inquiry to be made as to how far, without injury to the public service, the transmission of the mails on the Lord's-day might be diminished or entirely suspended."

As Lord Ashley's motion has thus suddenly become, not a Post-Office, but a Cabinet question, we will only add as our deliberate opinion—formed from an attentive consideration of the mechanism of the British Post-office—that if the measure prayed for be carried into effect, it will create a vast amount of inconvenience, complaint, and irritation. If the question of delivery or no-delivery

were to be left to the decision of the inhabitants of each postal district (as proposed by Mr. Rowland Hill), the experiment of no delivery would probably be tried in many places, would be continued in some, abandoned in others, according to the peculiar views and circumstances of each. But if the overwhelming majority of the community be *forced* to adopt the views advocated by a comparatively speaking very small party, the restriction will, we predict,* create throughout the United Kingdom *infinitely* more agitation than it is intended to allay.

PREPAYMENT.

Judging from the returns submitted to Parliament, it may be stated that of the million of letters which on an average are daily transmitted through the Post-Office, about sixty-five per cent. are franked by stamps, about thirty per cent. prepaid in money, and five per cent. unpaid.

It appears, therefore, that although stamps can be purchased with the greatest facility, there exists on the part of a portion of the public either a prejudice or a *vis inertiæ* which so lamentably induces them to neglect to do so, that very nearly one-third of the letters that pass through the Post-Office are prepaid in money instead of in stamps! As long as the choice of franking a letter by either means continues to be offered to the public, *they* cannot be reasonably blamed for acting as, on the

* This prediction has been verified by the almost immediate repeal of the law in question.

whim or caprice of the moment, they may feel inclined; and accordingly, although at all our great Clubs, the porter in waiting is ready from morning till night to sell stamps to any member who requires them, yet daily there are quantities of persons who will sit down to write notes merely to get rid of the rattling of some halfpence in their coat-pockets. Now the mischief to the community, and the expense to the country, of prepaying letters, requires, we believe, only to be fairly stated to be at once remedied.

1. Every person who prepays a letter, not only *creates* a temptation for his clerk, for his servant, or for his postmaster to pocket the money and destroy the letter, but, in consequence, the document not reaching its address, he inflicts upon the Postmaster-General the trouble, and upon the community the *cost*, of making for many weeks, and occasionally for many months, a series of searching inquiries which, though ineffectual, but too often end in leaving suspicion on some postmaster who is innocent; indeed in the Secretarial Department, in which sixty clerks are employed, a large portion of the business consists in answering complaints of the non-arrival of prepaid letters.*

2. Even when the letters and their satellite pennies are faithfully brought to the windows of the Post-Office, the transaction creates confusion and disorder highly discreditable to our postal system. In large

* Of "missing letters," one was stated by the complainant to have contained a bill of exchange for £28,750; another, three dozen birds'-eyes.

cities, and especially in London, the pressure for prepayment is often so rude, that money and letters forced from the hands of their owners have repeatedly been picked up from beneath the crowd that has been trampling upon them. And yet the impatient group is sometimes obliged to wait until, at nearly the very last moment, the window-clerk can weigh, calculate, and charge the proper amount of postage on ten or twelve bundles of "circulars" of the dullest description, brought by one man. Again, the angry crowd are often detained by the altercations and occasional imprecations of some old lady who is insisting on requiring change for a sovereign in payment of the postage of a penny letter!

As an effectual cure for the evils we have just mentioned, we most earnestly recommend that the Treasury should without delay, under the powers vested in it by Parliament, authorize the Postmaster-General to charge threepence for the prepayment of every single letter; for as it is quite as easy to buy a postage-stamp as paper, pens, ink, sealing-wax, and wafers, a portion of the public are not justified in not only bringing discredit upon a great national undertaking, but unnecessarily embarrassing and demoralizing the servants of the Post-Office.

A postage-stamp is a new coin of the realm expressly devised for the prepayment of letters; "*and,*" said an Irishman in describing it to his mate, "*the only difference I can see between it and a donkey is, that the one you lick with a stick, and the other you stick with a lick!*"

TRANSMISSION OF SOVEREIGNS, ETC., BY POST.

There exists another very serious abuse, by a small portion of the community, of the advantages of the penny postage system, which we trust will without delay be corrected. Under the old system of heavy charges, especially on enclosures, it of course did not practically answer to send gold and silver coin by post. As soon however as the public were allowed to forward packets to any portion of the United Kingdom at the rate only of twopence per ounce, the practice of sending metallic money was at first thoughtlessly and then recklessly adopted; and accordingly gold and silver, from having been most carelessly packed, have repeatedly been found at the bottom of the bags in such quantities, that in one year there were picked up in the London Office alone, in sovereigns and silver that had escaped out of letters, no less than £62. 8*s*. 6*d*. In one case, a man who had stuffed £4. 17*s*. 6*d*. loose into a common envelope, very bitterly complained at one of his sovereigns having fallen out! The Postmaster-General, by printed "Notices," over and over again remostrated with the public; his recommendations however were not only unheeded, but the window-men, who repeated them, were occasionally insulted. "Oh!" said a man, sneeringly, only the other day to one of these gentlemen, who was earnestly advising him not to send by post a letter evidently containing a sovereign, and which he insisted on prepaying, "if you will let it alone, it will go safe enough!"—implying that if *he* did not steal it, no one else would.

But this, alas! is not the case. The books of the department contain a long and affecting list of the names of active, intelligent sorters and letter-carriers who have proved unable to resist a temptation to which they ought not to have been exposed; besides which, suspicion at this moment is unavoidably resting upon many innocent men, in consequence of the immense number of such robberies that have not yet been detected.

With these evils before the mind, there can surely exist no doubt that—inasmuch as to afford a safe and ready means for conveying small sums BY POST to all parts of the United Kingdom, there has been expressly established that enormous and extensive banking system, "the Money-Order Department," which we have already described,—a very small fraction of the community ought not, in opposition to the remonstrances of Her Majesty's Postmaster-General, to the demoralization of the servants of the Post-Office, and to the discredit of a new system in which the interests of all classes of society are involved, to be allowed any longer to scatter broadcast over the country, sovereigns, crown-pieces, half-crowns, shillings, and sixpences, practically speaking with little more concealment than a mere label, stating to postmasters and letter-carriers, but too often inadequately paid, to whom they wish them to be delivered. For the benefit, therefore, of the public in general and of the servants of the Post-Office in particular, we earnestly recommend that any letter apparently containing gold or silver coin shall be forwarded by all postmasters to the London Inland Department,

to be opened at the Dead-Letter Office, in order that the sender thereof may be informed of the same, as also that on payment of an extra postage of one shilling the money enclosed, and the letter that contained it, will be delivered to him.

To conclude: If an additional postage of one penny per letter were to be charged to every person who prefers making the postman, or rather the public, wait until his servant shall open the door to receive a handfull of prepaid letters, which could rapidly be dropped, *exactly as they were posted,* through a receiving slit into a tortuous receptacle, from which it would be impossible for any but the right person to extract them, the delivery of the correspondence of the country would be PERFECT.

We are no admirers of unreasonable, arbitrary measures; nevertheless we cannot ignore the fact that by the new and startling introduction of Penny Postage, Parliament have induced the Governments of other countries to join with us in an attempt to lengthen and strengthen the pinions by which, under the blessing of the Almighty, the family of mankind now communicate with each other; that accordingly in the United States of America the stamped head of Washington, in Belgium that of King Leopold, in France that of the Goddess of Liberty, already frank letters at low rates to every portion of their respective dominions: indeed, Russia and Spain have lately adopted a uniform rate of postage. As, therefore, the civilized nations of the globe are readily following our example, it is no less our interest

than our duty, for their sakes as well as our own, that the system which we have thought fit to originate, and from which no sane person can now dream of retreating, should, in all possible respects, be fairly, scientifically, and effectually developed.

THE END.

JOHN EDWARD TAYLOR, PRINTER,
LITTLE QUEEN STREET, LINCOLN'S INN FIELDS.


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Digitized with financial assistance from the
Government of Maharashtra
on 15 March, 2016